

## Specifications and Tolerances Committee Interim Agenda

Michael J. Sikula, Chairman  
Assistant Director  
New York Bureau of Weights and Measures

### 300 INTRODUCTION

The Specifications and Tolerances (S&T) Committee ("Committee") will address the following items at its Interim Meeting. All items are listed below in Table A by Reference Key Number. The headings and subjects apply to NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices." The Appendices to the Report are listed in Table B. The acronyms for organizations and technical terms used throughout the agenda are identified in a glossary in Table C. In some cases background information will be provided for an item. The fact that an item appears on the agenda does not mean that the item will be presented to the Conference for a vote. The Committee will review its agenda at the Interim Meeting and may withdraw some items, present some items for information meant for additional study, issue interpretations, or make specific recommendations for change to NIST Handbook 44 which will be presented for a vote at the Annual Meeting.

The recommendations are statements of proposals and are not necessarily those of the Committee. Suggested revisions to the handbook are shown in **bold face print** by ~~striking out~~ information to be deleted and underlining information to be added. Requirements that are proposed to be nonretroactive are printed in **bold-faced italics**.

**Note:** The policy of NIST is to use metric units of measurement in all of its publications; however, recommendations received by the NCWM technical committees have been printed in this publication as they were submitted and may, therefore, contain references to inch-pound units.

**Table A  
Index to Reference Key Items**

Reference Key Number	Title of Item	Page
<b>300</b>	<b>INTRODUCTION</b> .....	<b>1</b>
<b>310</b>	<b>GENERAL CODE</b> .....	<b>4</b>
310-1	G-S.2. Facilitation of Fraud.....	4
310-2	G-S.5.6.1. Recorded Representation of Metric Units on Equipment with Limited Character Sets and Table 1. Recorded Representation of Metric Units on Equipment with Limited Character Sets .....	4
310-3	G-S.8.1. Multiple Weighing or Measuring Elements with a Single Provision for Sealing .....	5
<b>320</b>	<b>SCALES</b> .....	<b>7</b>
320-1	S.1.1. (c) Zero Indication; Requirements for Markings or Indications for Other than Digital Zero Indications.....	7
320-2	S.1.1. 1.(b) Digital Indicating Elements .....	8
320-3	S.1.2.1. Weight Units and T.N.2.1. General.....	10
320-4	S.1.4.6. Height and Definition of Minimum Reading Distance, UR.2.10. Primary Indicating Elements Provided by the User, UR.2.11. Minimum Reading Distance, and Definitions of Minimum Reading Distance and Primary Indications .....	11
320-5	S.2.1.7. Tare Rounding on a Multiple Range Scale .....	14
320-6	N.1.3.1. Bench or Counter Scales, N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers, and Appendix D; Definitions of Bench Scale and Counter Scale.....	17
320-7	N.1.3.6.1. Dynamic Monorail Weighing Systems.....	23
320-8	Table 4. Minimum Test Weights and Test Loads .....	24
320-9	Appendix D; Definitions for Tare Mechanism, Gross Weight Value, Net Weight, Net Weight Value, Tare, and Tare Weight Value .....	26

<b>324</b>	<b>AUTOMATIC WEIGHING SYSTEMS .....</b>	<b>28</b>
324-1	S.1.2. Value of Division Units and T.2.1. General .....	28
324-2	Note 5 Table S.7.b. Notes for Table S.7.a.; Temperature Range .....	30
<b>330</b>	<b>LIQUID-MEASURING DEVICES.....</b>	<b>32</b>
330-1	S.1.2.3. Value of the Smallest Unit .....	32
330-2	S.1.6.5.5. Display of Quantity and Total Price and S.1.6.5.6. Display of Quantity and Total Price, Aviation Refueling Applications .....	34
330-3	S.3.1. Diversion of Measured Liquid .....	35
<b>331</b>	<b>VEHICLE-TANK METERS.....</b>	<b>37</b>
331-1	Temperature Compensation .....	37
<b>356(a)</b>	<b>GRAIN MOISTURE METERS .....</b>	<b>40</b>
356-1	S.1.2. Grain or Seed Kind and Class Selection and Recording and Table S.1.2. Grain Types Considered for Type Evaluation and Calibration and Minimum Acceptable Abbreviations .....	40
<b>357</b>	<b>NEAR-INFRARED GRAIN ANALYZERS.....</b>	<b>41</b>
357-1	S.1.2. Selecting Grain Class and Constituent and Table S.1.2. Grain Types Considered for Type Evaluation and Calibration and Minimum Acceptable Abbreviations .....	41
<b>360</b>	<b>OTHER ITEMS.....</b>	<b>43</b>
360-1	International Organization of Legal Metrology (OIML) Report .....	43
360-2	Developing Items .....	45

---

**Table B**  
**Appendices**

---

<b>Appendix</b>	<b>Title</b>	<b>Page</b>
A	Item 360-2: Developing Items .....	A1
	Part 1, Item 1 Belt-Conveyor Scale Systems: UR.3.2.(c) Maintenance; Zero Load Tests .....	A1
	Part 1, Item 2 Belt-Conveyor Scale Systems: UR.2.2.(n) Belt Alignment .....	A2
	Part 2, Item 1 General Code: T.5. Predominance – Retail Motor-Fuel Devices.....	A3
	Part 2, Item 2 Liquid-Measuring Devices: Price Posting and Computing Capability and Requirements for a Retail Motor-Fuel Dispenser (RMFD) .....	A4
	Part 3, Item 1 Water Meters: U.R. 2.1. Accessibility for Reading.....	A5

---

**Table C**  
**Glossary of Acronyms**

CC	Certificate of Conformance	NCWM	National Conference on Weights and Measures, Inc.
CWMA	Central Weights and Measures Association	NEWMA	Northeastern Weights and Measures Association
EPO	Examination Procedure Outline	NIST	National Institute of Standards and Technology
GAS	Grain Analyzer Sector	NTEP	National Type Evaluation Program
GMM	Grain Moisture Meters	NTETC	National Type Evaluation Technical Committee
GPMA	Gasoline Pump Manufacturers Association	RMFD	Retail Motor-Fuel Dispenser
H44	NIST Handbook 44	SI	International System of Units
H130	NIST Handbook 130	SMA	Scale Manufacturers Association
LMD	Liquid-Measuring Device	SWMA	Southern Weights and Measures Association
LPG	Liquefied Petroleum Gas	WMD	Weights and Measures Division
MMA	Meter Manufacturers Association	WWMA	Western Weights and Measures Association
MFM	Mass Flow Meter	USNWG	NIST/OIML U.S. National Working Group
<p>“Handbook 44” means the 2007 Edition of NIST Handbook 44 “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices”</p> <p>“Handbook 130” means the 2006 Edition of NIST Handbook 130 “Uniform Laws and Regulations in the Areas of Legal Metrology and Fuel Quality.”</p>			
<p>Note: NIST does not imply that these acronyms are used solely to identify these organizations or technical topics.</p>			

---

**Details of All Items  
(In Order by Reference Key Number)**

---

## **310 GENERAL CODE**

### **310-1 G-S.2. Facilitation of Fraud**

**Source:** Western Weights and Measures Association (WWMA)

**Recommendation:** Amend Handbook 44, Section 1.10. General Code Paragraph G-S.2. as follows:

**G-S.2. Facilitation of Fraud.** - All equipment and all mechanisms, ~~and~~ devices, software, and programmable components attached, associated or interfaced thereto or used in connection therewith shall be so constructed, assembled, ~~and~~ installed, programmed, and/or coded for use such that they do not facilitate the perpetration of fraud.

**Background/Discussion:** This proposal modifies the language in Paragraph G-S.2. to clarify that the prohibition against facilitating fraud applies to the electronically programmed and coded components of weighing and measuring devices to address electronic manipulation or alteration. Some argue the existing language in Section 1.10. General Code. Paragraph G-S.2. Facilitation of Fraud is intended to address only hardware components of weighing and measuring devices. That is, “equipment, mechanisms, and devices” and the mechanics of how they are “constructed, assembled, and installed” appear to deal with tangible components. Fraud issues in the past ten years involved: (1) altering, manipulating, or interfering with software interfaced or installed in equipment; (2) microprocessor issues such as additional pulser units hidden in gas pumps and taximeters; and (3) software programs permitting manipulation of motor truck scale data used to generate weighmaster certificates.

WWMA, CWMA, and SWMA recommended this item move forward for a vote.

NEWMA recommended this item be referred to the NTETC Software Sector for review and input.

### **310-2 G-S.5.6.1. Recorded Representation of Metric Units on Equipment with Limited Character Sets and Table 1. Recorded Representation of Metric Units on Equipment with Limited Character Sets**

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Amend Paragraph G-S.5.6.1. and Table 1. as follows:

**G-S.5.6.1. Indications and Recorded Representation of Metric Units on Equipment with Limited Character Sets. – Appropriate Abbreviations.**

**(a) For equipment manufactured after January 1, 200X, the appropriate defining symbols are shown in NIST Special Publication SP 811 “Guide for the Use of International System of Units (SI) and Handbook 44 Appendix C–General Tables of Units of Measurement.”**

**Note: SP 811 can be viewed or downloaded at <http://physics.nist.gov/cuu/pdf/sp811.pdf>.  
(Added 200X)**

**(b) The appropriate defining symbols on equipment manufactured prior to January 1, 200X, with limited character sets are shown in Table 1. Representation of Units on Equipment Manufactured prior to January 1, 200X, with Limited Character Sets.**  
**(Added 1977) (Amended 200X)**

Table 1. Recorded Representation of Metric Units on Equipment Manufactured prior to January 1, 200X, with Limited Character Sets				
Name of Unit	International symbol (common use symbol)	Representation		
		Form I	Form II	
		(double case)	(single case lower)	(single case upper)
Base SI units				
meter	m	m	m	M
kilogram	kg	kg	kg	KG
Derived SI units				
newton	N	N	n	N
pascal	Pa	Pa	pa	PA
watt	W	W	w	W
volt	V	V	v	V
degree Celsius	°C	°C	°c	°C
Other units				
liter	l or L	L	l	L
gram	g	g	g	G
metric ton	t	t	tne	TNE
bar	bar	bar	bar	BAR

**Background/Discussion:** At its fall 2006 Annual Meeting, SWMA reviewed a proposal from the Weighing Sector to amend Paragraph G-S.5.6.1. The amendment would require abbreviations for SI units as specified in NIST Special Publication 811 “Guide for the Use of International System of Units (SI) and Handbook 44 Appendix C – General Tables of Units for both indications and recorded representations on new technology. The amendment would also continue to permit exceptions to those guidelines for older equipment with limited character sets. NIST WMD has received inquiries from device manufacturers regarding how to apply the requirements in Table 1. for the abbreviation of SI units. There appears to be confusion about the intent of Table 1. unless one is directed to review Paragraph G-S.5.6.1. in conjunction with Table 1. Additionally, there are devices where abbreviations for SI units may be confused with other abbreviations when used in devices designed with or capable of indicating and/or recording in other units of measure (e.g., inch-pound units) or with identifiers for measurement values such as gross, tare, and net (G, T, N).

Handbook 44 Paragraph G-S.5.6.1. was originally added to Handbook 44 in 1977 to address concerns about equipment with limited printing capabilities, that is, with either upper or lower case characters only. If a recording element, interfaced with a weighing system, is equipped with upper case characters only, it will print the symbol for kilogram as “KG.” It was the NCWM S&T Committee’s view that to require a lower case character capability solely to provide the appropriate symbol in lower case character (“kg”) would be cost prohibitive. Further, the Committee saw no problem in identifying “KG” as representing kilograms just as there is no problem in identifying the abbreviation for pound as “LB” or “lb.” The Committee also reviewed International Standard ISO 2955, which sets forth guidelines for the representation of SI and other units for use in systems with limited character sets.

WMD believes that permitting exceptions for abbreviations of SI units of measure is no longer necessary when considering advances in printer and display technology.

SWMA supported the proposal and agreed to forward it to the NCWM S&T Committee with a recommendation that it be a voting item on the Committee’s 2007 agenda.

### **310-3 G-S.8.1. Multiple Weighing or Measuring Elements with a Single Provision for Sealing**

**Source:** Carryover Item 310-3. (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee’s 2006 agenda.)

**Recommendation:** Add a new Paragraph G-S.8.1. as follows:

**G-S.8.1. Multiple Weighing or Measuring Elements with a Single Provision for Sealing. - A change to any metrological parameter (calibration or configuration) of any weighing or measuring element shall be individually identified.**  
**[Nonretroactive as of January 1, 200X]**

**Note: Examples of acceptable identification of a change to the metrological parameters of a weighing or measuring element include, but are not limited to:**

- (1) a broken, missing, or replaced physical seal on an individual weighing, measuring, or indicating element or active junction box;**
  - (2) a change in a calibration factor or configuration setting for each weighing or measuring element;**
  - (3) a display of the date of or the number of days since the last calibration or configuration event for each weighing or measuring element; or**
  - (4) counters indicating the number of calibration or configuration events per weighing or measuring element.**
- (Added 200X)**

**Background/Discussion:** The Committee believes a General Code requirement for identification of adjustments to individual weighing or measuring elements is appropriate regardless of the device type when systems have multiple weighing or measuring elements with a single provision for sealing. Initially, the proposal was developed to add to all the liquid-measuring device codes a requirement for identifying when an adjustment is made to any measuring device which has multiple measuring elements, but is equipped only with a single provision for sealing the adjustment mechanism. After rejecting a meter for not meeting performance requirements, jurisdictions reported difficulty in determining whether or not repairs or adjustments were made to that meter. During the subsequent inspection, an official might have to test multiple grades or blends to confirm the rejected meter had been corrected. The proposed requirement is similar to the current requirement in Section 3.30. Paragraph S.2.2.1. Multiple Measuring Elements with a Single Provision for Sealing.

The Committee has heard from the weighing industry that the proposal is not appropriate for all devices. The Committee believes it is important to be sure no specific Handbook 44 codes are adversely affected by placing the requirements in the General Code; therefore, the Committee agreed to make the proposal an information item to provide the opportunity for the National Type Evaluation Technical Committee Sectors and the regional weights and measures associations to evaluate the item further, especially for any adverse impact on a particular device type(s).

A General Code requirement addresses all possible device types, including weighing systems, and any scenario where metrological parameters (calibration or configuration) have a single means for security. The list of acceptable means for individually identifying a change to a metrological parameter addresses devices where features are accessed through an indicator or active junction box, but is not meant to be all-inclusive. Examples of weighing systems that have multiple weighing elements connected to a single indicator such that the calibration of each is controlled by a single seal include “in-and-out” weighing systems, shipping scale systems equipped with at least two platforms with different capacities connected to a single indicator, and multiple platform vehicle scales and axle-load weighers used for highway load enforcement or for truck operators’ use such as “Cat Scales.” Additionally, NTEP has evaluated indicators with the ability to support up to as many as ten weighing elements.

At the July 2006 NCWM Annual Meeting, the Committee received a comment that if the proposal is adopted in 2007, then LMD Code Paragraph S.2.2.1. would be redundant and should be deleted.

At their fall 2006 meetings CWMA, NEWMA, SWMA, and WWMA agreed the proposal should move forward for a vote as written. CWMA agreed that if this item is adopted, LMD Code Paragraph S.2.2.1. becomes redundant and should be deleted. WWMA agreed the proposal should apply to all device technologies where multiple components with metrological functions are secured by a single seal. WWMA also heard that there are weighing devices with multiple load-receiving elements interfaced to a single indicator (where sealing occurs) that have the ability to track changes to metrological parameters through an audit trail. Devices with an event logger would comply with the proposal. Devices utilizing only common counters for calibration and configuration parameters that increment one time when one or more

weighing or measuring element has been accessed would still need an additional means, such as a calibration factor for each element, to identify that changes were made to a particular element.

For additional background information, refer to the Committee's 2006 Final Report.

## 320 SCALES

### 320-1 S.1.1.(c) Zero Indication; Requirements for Markings or Indications for Other than Digital Zero Indications

**Source:** Carryover Item 320-1. (This item originated from the Committee and first appeared on its 2004 agenda.)

**Recommendation:** Amend Paragraph S.1.1.(c) as follows:

#### S.1.1. Zero Indication.

- (a) On a scale equipped with indicating or recording elements, provision shall be made to either indicate or record a zero-balance condition.
- (b) On an automatic-indicating scale or balance indicator, provision shall be made to indicate or record an out-of-balance condition on both sides of zero.
- (c) A zero-balance condition may be indicated by other than a continuous digital zero indication, provided that an effective automatic means is provided to inhibit a weighing operation or to return to a continuous digital indication when the scale is in an out-of-balance condition **and is marked or includes supplemental indications to indicate that the "other than continuous digital zero indication" represents a no-load condition of the scale.**

(Added 1987) (Amended 1993 **and 200X**)

**Note: The markings or supplemental indications in S.1.1.(c) are not required if, prior to the start of a transaction: (1) operator intervention is required to verify the zero-balance condition with a digital zero indication, or (2) for a scale equipped to indicate a zero-balance condition by a digital zero indication, the scale automatically resets to a digital zero indication.**  
**(Added 200X)**

(Amended 1987)

**Background/Discussion:** The proposed changes to the requirement are intended to clarify that all primary indicators on scales using anything other than a digital zero indication (e.g., scrolling messages, dashes, etc.) to indicate zero require additional markings or indications to inform customers the scale is at a zero-balance condition. No markings are necessary on these devices when operator intervention is required to return the indication to a digital zero before conducting a transaction. The proposal addresses instances where the OEM elects to display rather than mark the information (i.e., supplemental indications). The proposed changes are meant to be applied retroactively and, therefore, apply to all equipment including self-service applications that have undergone type evaluation.

The proposal is more than a simple clarification or housekeeping item. The proposed language is not in conflict with type evaluation procedures in Publication 14 (a document derived from Handbook 44 requirements). The proposal is warranted because of ongoing disagreements between NTEP laboratories at type evaluation on whether or not a scale complies with Paragraph S.1.1.(c). If the proposal is adopted, the labs will find that Publication 14 and Handbook 44 agree and there is no vagueness in the wording of either document or room for misinterpretation. Since field officials may not have access to Publication 14, they need definitive guidelines in their working documents on how to apply the requirement should devices be modified after type evaluation.

In 2004 the Committee interpreted General Code Paragraph G-S.6. Marking Operational Controls, Indications, and Features and Paragraph S.1.1. as requiring weighing devices to be marked or provide an indication stating the zero balance is represented by other than a digital zero indication. This position is supported by the 1993 amendment to Paragraph S.1.1.(c) as well as type evaluation requirements and other Handbook 44 requirements adopted to ensure

customers have sufficient information about displays and recorded transaction information in order to make an informed decision during a direct sale transaction.

The Committee has heard opposition to the proposal from several regional associations, the Weighing Sector, and scale manufacturers. These groups cited the following reasons for taking this position: (1) current Handbook 44 language provides sufficient guidelines, (2) labeling criteria applied during type evaluation offers adequate protection from fraud, (3) the type evaluation laboratory determines that labeling is not necessary if a scale has an automatic means to inhibit a transaction when it is out of balance or returns to a continuous digital indication when in an out-of-balance condition, or (4) several jurisdictions have indicated they are not receiving any complaints because equipment lacks explanatory marking information.

The Committee believes provisions should be in place for all devices to clearly indicate a zero-balance condition either with a digital zero, an annunciator, or using some other accepted means. The Committee is concerned there are no definitive guidelines available for the field official to verify a zero-balance condition on software-based devices modified after type evaluation. The Committee continues to believe the proposal has some merit, but modified the language in response to comments that there is confusion about the language that addresses markings and indications. The Committee made changes to S.1.1.(c) to: (1) specify that markings and indications must be visible to the customer and (2) to clarify one instance where markings and indications are not required.

The Committee heard further opposition to the proposal from the public and private sector members who believe the wording in Paragraph S.1.1.(c) is adequate to prevent fraud. However, one jurisdiction in support of the proposal noted that an indication other than zero would not be acceptable for devices such as a retail motor-fuel dispenser since it found dispensers in the field with no zero indication as a result of software changes made to indications after type evaluation. Consequently, the Committee changed the status of the proposal from a voting item to an information item. The Committee asked that the regional weights and measures associations consider the proposal during their 2006 fall sessions, being mindful that there are installations where the operator is not present to verify a zero-balance condition.

WWMA agreed it should be clear that a scale starts a transaction at zero. WWMA believes the proposed modifications to (c) are sufficient and the note describing when markings are not necessary is redundant. WWMA further asserts that part (2) of the note describing how the device must function is not clearly worded. Consequently, WWMA supports the proposal as a voting item, but without the addition of the proposed note. SWMA supports the WWMA alternate proposal.

CWMA and NEWMA recommend this proposal be withdrawn because the current wording in NIST Handbook 44 is sufficient.

For additional background information, refer to the Committee's 2004, 2005, and 2006 Final Reports.

### **320-2 S.1.1. 1.(b) Digital Indicating Elements**

**Source:** National Type Evaluation Technical Committee (NTETC) Weighing Sector

**Recommendation:** Amend Paragraph S.1.1.1.(b) Digital Indicating Elements as follows:

#### **S.1.1.1. Digital Indicating Elements.**

- (a) A digital zero indication shall represent a balance condition that is within  $\pm \frac{1}{2}$  the value of the scale division.
- (b) *A digital indicating device shall either automatically maintain a "center-of-zero" condition to  $\pm \frac{1}{4}$  scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero balance condition to  $\pm \frac{1}{4}$  of a scale division or less. The auxiliary or supplemental "center-of-zero" indicator may be operable with a zero net weight indication.*

*[Nonretroactive as of January 1, 1993]*

(Amended 1992 **and 200X**)



SWMA recommends an alternate proposal as follows:

S.1.1.1. Digital Indicating Elements.

- (a) A digital zero indication shall represent a balance condition that is within  $\pm \frac{1}{2}$  the value of the scale division.
- (b) A digital indicating device shall either automatically maintain a "center-of-zero" condition to  $\pm \frac{1}{4}$  scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero balance condition to  $\pm \frac{1}{4}$  of a scale division or less. **The auxiliary or supplemental "center-of-zero" indicator may be operable with a zero condition in the net weight mode.**  
[Nonretroactive as of January 1, 1993]

(Amended 1992 **and 200X**)

**Discussion:** Scales Code requirements do not include sufficient detailed language that identifies all types of tare, define how tare features must operate, or specify the net and tare values a scale must indicate and record. Current NIST Handbook 44 requirements that address tare include Paragraphs S.2.1.6. Combined Zero-Tare ("0/T") Key, S.2.3. Tare, S.2.3.1. Monorail Scales Equipped with Digital Indications, and T.N.2.1. General (Tolerances). This Weighing Sector proposal is the first of several proposed modifications to Handbook 44 requirements intended to clarify the suitability of tare features that are already widely used in commercial applications.

The Weighing Sector developed criteria used to type evaluate tare features based on General Code Paragraph G-S.2. Facilitation of Fraud and other requirements that apply to indicating and recording elements and recorded representations. NTEP laboratories find that it has become increasingly difficult to solely base its compliance decisions on Paragraph G-S.2. because the general nature of the language results in multiple interpretations. Type evaluation criteria are published in NCWM Publication 14; however, this document is not in wide distribution in the weights and measures community and only a limited number of weights and measures officials, device manufacturers, and device owners and operators are regular participants in Weighing Sector meetings where tare evaluation criteria are developed and discussed. Additionally, it is difficult for parties responsible for the design, use, and test of the tare feature to interpret and apply technical requirements published in Publication 14. This results in differing interpretations of Handbook 44 requirements.

In 2006, the NTETC Weighing Sector formed a Tare Work Group to review existing tare requirements and make recommendations about how tare is to operate on a single range scale, multiple range scale, and multi-interval scale. The work group was also asked to develop, where necessary, recommendations for changes to Publication 14, Handbook 44, and Handbook 130 and to provide guidance to the Weighing Sector on type evaluation requirements.

The work group is currently developing proposals to amend Handbook 44 requirements to: (1) ensure that a tare feature operates in a manner that increases the accuracy of net weight determinations, (2) clearly state what information and values are permitted and required for indicated and recorded representations of net weight and tare weight, and (3) identify the types (e.g., semiautomatic and stored tares) of tare weight values that are determined at the time objects are weighed or tare weight values that are determined prior to the time objects are weighed. The Weighing Sector agreed the work group's proposal to amend Paragraph S.1.1.1.(b) further clarifies that an auxiliary or supplemental "center-of-zero" indication is permitted with a load on the scale provided tare material is zero-balanced off by the tare mechanism and prescribes that the acceptable limits of accuracy are within  $\pm \frac{1}{4}$  scale division for the resulting zero net indication. The Weighing Sector recommends the adoption of the proposal as an important step to promoting the development of specific language in Handbook 44 for specifications, test notes, and tolerances for different types of tare (e.g., tare, preset tare, percentage tare, etc.).

SWMA supports the intent of the Weighing Sector's proposal, but agreed that some modifications to the text were needed to clarify that the center-of-zero indicator may be operable when a zero condition exists in the net weight mode. SWMA recommends that its alternate proposal move forward as a voting item to the NCWM S&T Committee's agenda.

### 320-3 S.1.2.1. Weight Units and T.N.2.1. General

**Source:** National Type Evaluation Technical Committee (NTETC) Weighing Sector

**Recommendation:** Add new note to Paragraph S.1.2.1. and amend Paragraph T.N.2.1. as follows:

***S.1.2.1. Weight Units.** - Except for postal scales, a digital-indicating scale shall indicate weight values using only a single unit of measure. Weight values shall be presented in a decimal format with the value of the scale division expressed as 1, 2, or 5, or a decimal multiple or submultiple of 1, 2, or 5.  
[Nonretroactive as of January 1, 1989]*

**Note:** The requirements that the value of the scale division be expressed as 1, 2, or 5, or a decimal multiple or submultiples of 1, 2, or 5 does not apply to net weight values that are calculated from gross and tare weight indications where the scale value of the gross weight is different from the scale value of the tare weight(s) on multi-interval or multiple range scales. For example, a scale indicating in 2-kg divisions in the lower range or segment and 5-kg divisions in the higher range or segment may result in net values ending in three (3) or eight (8) or a scale indicating in 20-lb divisions in the lower range and 50-lb divisions in the higher range or segment may result in net values in 30 or 80.

[Nonretroactive as of January 1, 1989]

(Added 1987) (Amended 200X)

**T.N.2.1. General.** - The tolerance values are positive (+) and negative (-) with the weighing device adjusted to zero at no load. When tare is in use, the tolerance values are applied from the tare zero reference (**zero net indication**); the tolerance values apply to the net weight indication for every possible tare load using certified test loads ~~only~~.  
(Amended 200X)

SWMA recommends the Committee also consider modifying Paragraph S.2.3. as follows:

**S.2.3. Tare.** - *On any scale (except a monorail scale equipped with digital indications), the value of the tare division shall be equal to the value of the scale division.\* The tare mechanism shall operate only in a backward direction (that is, in a direction of underregistration) with respect to the zero-load balance condition of the scale. A device designed to automatically clear any tare value shall also be designed to prevent the automatic clearing of tare until a complete transaction has been indicated.\*  
(Amended 1985)*

*[Note: On a computing scale, this requires the input of a unit price, the display of the unit price, and a computed positive total price at a readable equilibrium. Other devices require a complete weighing operation, including tare, net, and gross weight determination]\*  
[\*Nonretroactive as of January 1, 1983]*

**This requirement does not apply to multi-interval scales or multiple range scales when the value of tare is determined in a lower range.**  
(Amended 200X)

**Discussion:** In 2006, the NTETC Weighing Sector formed a Tare Work Group to review existing tare requirements and make recommendations about how tare is to operate on a single range scale, multiple range scale, and multi-interval scale. The work group was also asked to develop, where necessary, recommendations for changes to Publication 14, Handbook 44, and Handbook 130, and to provide guidance to the Weighing Sector on related type evaluation requirements.

This proposal, which was developed by the Tare Work Group and is supported by the Weighing Sector, adds a new note to Paragraph S.1.2.1. The note recognizes display and printing of net weight values in divisions other than the scale division used in the display of gross weight, resulting in a more accurate net weight determination.

The proposal also amends Paragraph T.N.2.1. to clarify that tolerances also apply to net weight indications regardless of the gross load on the scale. The Tare Work Group reviewed OIML R 76 "Nonautomatic Weighing Instruments" for

corresponding requirements and to determine if there were areas where Handbook 44 could be aligned with international recommendations. Based on that review, the work group agreed that Handbook 44 Paragraph T.N.2.1. should be modified to state that tolerances also apply to net load indications.

The Tare Work Group discussed problems associated with determining the appropriate direction to round tare on multi-interval scales and multiple range scales whenever gross and tare weights fall in different weighing segments on a multi-interval scale or in different weighing ranges on multiple range scales. In these cases, the scale division size for the gross and tare weights differ; however, the net weight must be in mathematical agreement with the gross and tare weights that are indicated and recorded by the device (i.e., gross weight - tare weight = net weight).

The problem arises when the tare weight is rounded up to the next larger scale division where the net weight falls in the higher segment or range. For example, a 0.004 lb tare weight in a weighing range or segment with 0.002 lb intervals in the lower weighing range or segment may round to zero when the net weight falls in the upper weighing range with 0.01 lb intervals:

$$\begin{array}{r} 10.05 \text{ lb Gross Weight} \\ - 0.004 \text{ lb Tare Weight} \\ \hline = 10.046 \text{ lb the Mathematically Correct Net Weight;} \end{array}$$

However, due to rounding the device indicates 10.05 lb Net Weight

This results in a transaction where a commodity is bought or sold on the basis of gross weight or when an insufficient amount of tare weight is taken and results in a misrepresentation of net weight for the transaction. Essentially, the rounding of tare that falls in a smaller division in either direction (e.g., a 0.015 lb tare weight rounded down to zero or to 0.01 lb or up to 0.02 lb) provides a less accurate net weight.

The Tare Work Group developed a corresponding proposal for the Automatic Weighing Systems Code to clarify the appropriate scale division values and the application of tolerances to tare weights for those devices (see S&T Item 324-1).

SWMA supports the recommendation; however, SWMA also agreed that an additional note should be added to Paragraph S.2.3. Tare, as shown in the recommendation above to eliminate any conflict with proposed changes to Paragraph S.1.2.1. The new note proposed for Paragraph S.2.3. clarifies that the requirement does not apply to multi-interval scales or multiple range scales when tare is determined in the lower range of those scales.

#### **320-4 S.1.4.6. Height and Definition of Minimum Reading Distance, UR.2.10. Primary Indicating Elements Provided by the User, UR.2.11. Minimum Reading Distance, and Definitions of Minimum Reading Distance and Primary Indications**

**Source:** Carryover Item 320-2. (This item originated from the National Type Evaluation Technical Committee (NTETC) Weighing Sector and first appeared on the Committee's 2006 agenda.)

**Recommendation:** The Committee considered the Weighing Sector's first attempt at a proposal that adds new Paragraphs S.1.4.6., UR.2.10., and UR.2.11. to the Scales Code.

#### **S.1.4. Indicators.**

##### **S.1.4.6. Height. - All primary indications shall be indicated clearly and simultaneously.**

- (a) On digital devices that display primary indications during direct sales to the customer, the numerical figures displayed to the customer shall be at least 9.5 mm (0.4 in) high.**
- (b) The units of mass and other descriptive markings or indications, such as lb, kg, gross, tare, net, etc., shall be clearly and easily read and shall be at least 2 mm (0.08 in) high.**

**[Nonretroactive as of January 1, 200X]**

**(Added 200X)**

## UR.2. Installation Requirements

**UR.2.10. Primary Indicating Elements Provided by the User.** – Primary indicating elements that are not the same as the primary indicating elements provided by the original equipment manufacturer (e.g., video display monitors) shall comply with the following:

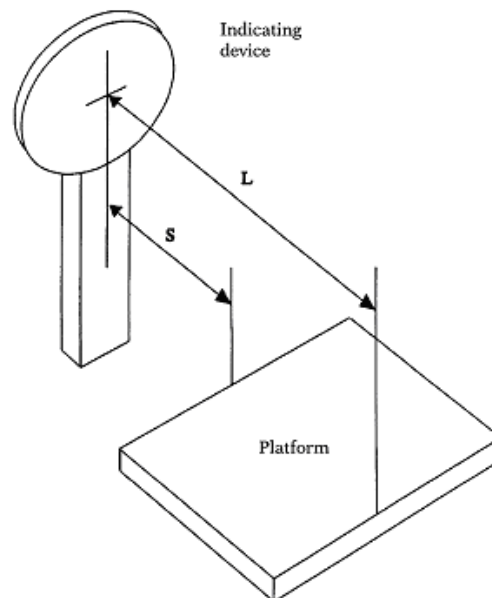
- (a) On digital devices that display primary indications during direct sales to the customer, the numerical figures displayed to the customer shall be at least 9.5 mm (0.4 in) high.
- (b) The units of mass and other descriptive information, such as gross, tare, net, etc., shall be displayed or marked on the device and shall be at least 2 mm (0.08 in) high.

(Added 200X)

**UR.2.11. Minimum Reading Distance** – On digital devices that display primary indications, the height of the numbers expressed in millimeters should be not less than 3 times the minimum reading distance expressed in meters, without being less than 2 mm (0.08 in). (Example: If the height of the primary indications is 10 mm, then the minimum reading distance should not be greater than 30 m).  
(Added 200X)

Add new definitions of “minimum reading distance” and “primary indications” to Appendix D as follows:

**minimum reading distance.** The shortest distance that an observer is freely able to approach the indicating device to take a reading under normal conditions of use. This approach is considered to be free for the observer if there is a clear space of at least 0.8 m in front of the indicating device. However, if the minimum reading distance “S” in Figure X is less than 0.8 m, then the minimum reading distance is “L” in Figure X. [2.20]  
(Added 200X)



**Figure X**

**primary indications.** Weight or other units of measurement values that are displayed by a primary indicating element. The primary indications are used as the determining factor in arriving at the sale representation when the device is used commercially. (Examples of primary indications include the measurement value, unit price or count, and total price on instruments capable of price computing).

**Primary indications do not include indications from auxiliary indicating devices such as totalizing registers and pre-determined stop mechanisms.) [1.10], [2.20]**  
**(Added 200X)**

This proposal was developed to address a growing problem with the readability of weight indications and the values that define transaction information. Field and laboratory officials indicate both are becoming increasingly smaller, as demonstrated in the following example of a weight display where the actual size of the weight values are 23 mm in height, but the unit of measurement (g) is 4 mm in height.



Field and laboratory officials need more specific requirements to consistently determine if indications are suitable for the environment in which the device is used. Currently only the Taximeters, Grain Moisture Meters, and Near-Infrared Grain Analyzers Codes include requirements that specify the minimum height of figures, words, and symbols. The size requirements for all three device technologies were developed primarily because of concerns about the visibility of indications from the customer's position. NIST Handbook 44 and NCWM Publication 14 include no uniform size requirements or specific guidelines on how to evaluate display information for clarity and readability for equipment other than these three device types.

The Weighing Sector developed and voted on a proposal which provided guidelines for determining whether or not indications are appropriate in a particular installation. The Weighing Sector's proposal was aligned with OIML R 76 requirements for visibility of indications to the customer in direct sale applications, minimum height of lettering for identification information, and the minimum height of numbers for analog indicating devices.

In 1999 a similar proposal to amend General Code Paragraph G-S.5.2.3. Size and Character to include minimum height requirements was considered but later withdrawn. GPMA expressed strong opposition to the 1999 proposal because many of the measuring devices were equipped with quantity displays that would not meet the proposed 9.5 mm size requirement. The Committee agreed at the time that officials need uniform guidelines that are not ambiguous as to which transaction information must meet size requirements. However, the Committee also believed that any future proposals should address a specific device technology since it is difficult to address all device configurations and the environmental conditions that exist at each installation site.

The Weighing Sector balloted its members with expectations of only minor changes to the proposal. The Weighing Sector received feedback that the definition and illustration of a minimum reading distance were confusing. SMA also opposed the proposal because it believed a reading distance requirement is unenforceable.

The Committee also received comments from a consultant that the proposal is unnecessary. General Code Paragraph G.S.5.1. Indicating and Recording Elements can be applied in type approval and thus eliminates the need to borrow any corresponding language from R 76 or add any language to Handbook 44. Comments received suggest that the United States should stick to performance-based requirements, noting that the proposal does not adhere to that principal.

The Committee agreed that although the clarity and readability of indications is a growing issue, the current proposal has only limited support from the public and private sectors. The Committee recognized the proposal requires a significant

amount of work before the language is clear, technically correct, and deemed applicable to the different types of installations and technologies in current use. The Committee has concerns about whether or not the proposed 2 mm height requirements for units of measurement and other markings are adequate. The Committee also questioned the clarity of the proposed user requirements for the minimum reading distance. Therefore, the Committee asked the Weighing Sector to continue its work to develop the proposal and possibly consider two separate proposals—a design specification and a user requirement—since the specification for the primary indication height is nearer to completion. The Committee agreed the proposal should remain an information item to allow the Weighing Sector sufficient time to fully develop the language.

At its September 2006 meeting, WWMA agreed that a minimum height requirement for values should be specified in design requirements and in user requirements that apply throughout the life of the device, especially when any modifications are made to the original equipment. WWMA believes the proposed new user requirement and definition pertaining to “minimum reading distance” are not clear and, therefore, are not necessary because they are already addressed elsewhere in Handbook 44. The requirements for ensuring values are adequate in size in all possible installation sites are also addressed elsewhere in General Code Paragraphs G-UR.2.2. Installation of Indicating or Recording Element and G-UR.3.3. Position of Equipment. Consequently, WWMA modified the proposal by removing proposed new Paragraph UR.2.11. and the definition of minimum reading distance and kept the Weighing Sector's proposed requirements for the minimum height requirements and the definition of primary indications recommending the modified proposal move forward as a voting item to the NCWM S&T Committee agenda.

CWMA believes that the proposed new user requirement and definition pertaining to “minimum reading distance” are already addressed in the user requirements of the General Code (G-UR.2. Installation Requirements). The requirement for ensuring that values are adequate in size are also addressed in the same General Code section. Therefore, CWMA agreed to the proposal of removing new Paragraphs UR.2.10. and UR.2.11. from the proposal and recommended the amended language move forward as a voting item.

During its 2006 meeting, the Weighing Sector reviewed taximeter requirements for the minimum height of figures, words, and symbols for comparison with the proposed Scales Code requirements. The public members concluded the minimum height requirements for figures, words, etc., (3.5 mm) were 35 % of those for fare indications (10 mm). The size requirements in the current Scale's Code proposal represent a relationship of 21 %. The Weighing Sector did not reach a consensus on the most appropriate relationship for this displayed information. The Weighing Sector agreed to consider an alternate proposal that specifies the proposed size requirements for units of mass and other descriptive markings or indications as 21 % of the height of primary indications rather an exact length value. The Weighing Sector was not able to discuss the user requirements or definitions because of time constraints.

CWMA and NEWMA agreed that proposed new Paragraphs UR.2.10. and UR.2.11. and the proposed new definition of “minimum reading distance” are not needed and are addressed elsewhere in Handbook 44; they agreed the proposed new Paragraph S.1.4.6. alone is sufficient. However, NEWMA questions whether or not the 2 mm height minimum in Subparagraph (b) is unrealistically small. One NEWMA member suggested that the minimum be some fraction of the height of the primary indication but no smaller than 4 mm or 5 mm. NEWMA has no specific recommendations but supports this item as an information item until new language regarding the minimum height can be agreed upon.

SWMA supports the Weighing Sector's recommendation in principle, but it is not certain that 21 % is the correct relationship.

#### **320-5 S.2.1.7. Tare Rounding on a Multiple Range Scale**

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Add a new Paragraph S.2.1.7. to the Scales Code as follows:

**S.2.1.7. Tare Rounding on a Multiple Range Scale. - A multiple range scale with tare capability must indicate and record values that satisfy the equation:**

$$\text{net} = \text{gross} - \text{tare}$$

**and round the tare value up to the larger division size when entering the larger division.**  
**(Added 200X)**

**Discussion:** A recent reversal of a ten-year-old NTEP policy now permits the operation of tare on multiple range scales to round down, thus overstating the quantity. SWMA believes this Weighing Sector decision to round tare down should be addressed by all members of NCWM. The proposal was developed to eliminate any conflict in the operation of the tare function on multiple range scales in the determination of a net weight.

Currently, there may be a conflict between NIST Handbook 44 requirements and NCWM Publication 14 policy for rounding tare values on multiple range scales. NIST Handbook 44 General Code Paragraph G-S.5.2.2.(c) Digital Indication and Representation requires that digital values round off to the nearest minimum unit that can be indicated or recorded. Also in question is a possible conflict with NIST Handbook 130 guidelines which specify that in no case shall rounded values result in overstating the net quantity. NTEP is also revising its tare criteria through its Tare Work Group to ensure there is no further conflict with NIST Handbook 44.

At their fall 2006 meetings, the regional weights and measures associations considered this SWMA proposal as part of ongoing work by the Weighing Sector Tare Work Group when SWMA intended it to be a separate proposal that addresses only tare rounding policies and procedures for multiple range scales. WWMA believes the issue of tare capability is complex and the proposal also needs to address the suitability of the tare division size; prohibition of division sizes other than 1, 2, and 5; the scale application (buying or selling); and other issues that relate to tare. For these reasons, WWMA believes the proposal should be thoroughly developed in the NTETC Weighing Sector prior to forwarding it to the NCWM S&T Committee for action. Consequently, WWMA recommended withdrawing the SWMA proposal. CWMA and NEWMA opposed this proposal as presented and agreed to await further input from the Weighing Sector Tare Work Group.

During its 2006 meeting, SWMA considered its proposal, designated in 2006 as a developing item, an urgent matter that no longer needs input because the proposal is ready for national consideration. SWMA reports that a majority of the Weighing Sector believes the criteria noted in Publication 14 for use in type evaluation of devices with the tare feature do not meet Handbook 44 requirements. SWMA agreed that the decision to permit rounding keyboard tare down on multiple range scales is facilitation of fraud. The customer and the operator observe that a tare weight was entered in the lower range of a multiple range scale. When the gross weight is in a higher weighing range, the customer is not provided with "clear, definite, accurate" indications of the possible reduction of tare.

SWMA recognizes that OIML permits rounding tare down, but believes that customers are not able to make adjustments in unit prices to compensate for losses when tare is rounded down, whereas businesses can adjust the price to compensate for overhead expenses and losses that occur if tare is rounded up.

SWMA provided discussion and examples to support its position as follows:

*History*

The operation of "tare" on a weighing device was first addressed in detail in 1971. In the 1971 Committee's Final Report (see NIST Special Publication (SP) 358, Page 170), the rationale for adding Paragraph S.2.3. Tare Mechanism to Handbook 44 was to ensure net weight is represented for commodities sold directly over computing scales and to recognize new developments in device technology. Tare capability and its operation were again addressed in S&T Item 301-3 Tare of the 1980 Committee's Final Report (see NIST SP 599 Page 216). The report noted "a key factor is the requirements in Paragraphs G-S.2. Facilitation of Fraud and G-S.5.1. Indicating and Recording Elements, General specify the indications to be clear, definite, accurate, and easily read by all parties involved in the weighing operation."

SWMA notes that some believe that General Code Paragraphs G-S.5.2.2. Digital Indication and Representation is intended to address the rounding of tare to the nearest minimum unit when it was amended in 1973. However, the 1980 Committee's Final Report notes only General Code Paragraphs G-S.2. and G-S.5.1. Furthermore, there is no evidence in any of the Final Reports that the Committee agreed that the practice of rounding tare up, which has been NTEP policy, is in conflict with Handbook 44.

In 2006, the Weighing Sector technical advisor contacted two members of the 1980 NCWM S&T Committee and determined that the focus of tare discussions were on single range scales, rather than multi-interval scales and multiple range scales, and followed rounding rules listed in Handbook 44. Consequently, specific interpretations or proposals were needed to determine how requirements apply to multi-interval and multiple range devices.

SWMA provided an example to make its point that if no tare is taken, the store has sold less than the quantity represented. Consider an example where a store's deli is selling cheese for \$7/lb and the weight of the roll of wrapping paper used in the deli is 40 lb. Sections of the wrap used in individual transactions are not heavy enough to register on the scale during a single transaction; however, if no tare is taken, the store collects an extra \$280 (40 lb x \$7/lb). The store controls the unit price for the commodity and selects the tare material and the resolution for the scale that it uses. SWMA heard the argument that the store is losing money if it is forced to round tare up. SWMA's response to that argument is to remind everyone that businesses view such losses as part of overhead expenses, which most typically compensate for by making adjustments to their unit prices. The customer does not have the ability to adjust or bargain on the unit price.

SWMA notes that the loss to the customer when tare is rounded down is larger when scale error is on the plus side, even though the scale is within accuracy tolerances. In this case, SWMA does not believe scale error is a justification for selling less than the quantity represented. For example, given a 30 lb x 0.01 lb scale:

The scale has an internal error of plus (+) 0.012 lb, which is displayed as 0.01 lb, which is within maintenance tolerance. However,

If the tare material used weighs 0.004 lb, there is an increased loss to the customer from 0.01 lb to 0.02 lb since (0.012 lb + 0.004 lb = 0.016 lb would be displayed as 0.02 lb on the scale)

#### *OIML*

Historically, weights and measures officials have been against rounding tare down. But what should occur if you are rounding to the nearest division? Is zero considered a division? SWMA acknowledges that zero is a division. The OIML Secretariat of TC9/SC1 for Nonautomatic Weighing Instruments R 76 noted in his response to the United States inquiry on that same question was "of course, rounding the tare value to zero is possible if it is less than 0.5  $e_i$  (interval of the weighing segment) of the actual range  $i$  (interval)." Multiple range scales meet R 76 rounding criteria when they round to zero. However, R 76 Section 4.13.3.2 Semi-automatic Tare Device specifies that an instrument may be fitted with semi-automatic tare devices if the action of the tare devices does not permit a reduction of the value of the tare.

SWMA notes that there is not consensus within the international weighing and measuring community to allow tare to round down. A direct quote of the Netherlands position on the latest draft of R 76 (in regard to 4.6.12.5 Multi-interval instrument with a preset tare device) was "In principle the conclusion that with  $e = 2$  g the value of 3 g can be rounded to 2 g or 4 g is correct. However could we not agree in this Recommendation that 1 g or 3 g always will be rounded up (because in the case where  $e = 1$  g, a tare value of 0.5 g is always rounded up)."

#### *Application of Tare Rounding Criteria*

On multi-interval scales tare is restricted to the smallest division, thus eliminating the possibility of rounding tare below its actual weight. For example, criteria for rounding tare on a multiple range scale results in a tare value of 12 lb in Range 1, but when the net weight causes the scale to switch to Range 2, the tare value would become 10 lb.

The Tare Work Group considered the problems of tare rounding can be demonstrated in another example that was considered by the Tare Work Group which illustrates some of the losses that can occur to parties involved in a transaction that is conducted on a multiple range scale where different rules for rounding are applied:



Given a multiple range scale where,

Capacity of the first range = 60 lb; scale division of the first range = 0.01 lb

Capacity of the second range = 300 lb; scale division of the second range = 0.1 lb

	No Tare Rounding in the 2 <sup>nd</sup> Range	Tare Rounded Down to Nearest Division in the 2 <sup>nd</sup> Range	Tare Rounded Up to Nearest Division in the 2 <sup>nd</sup> Range
Gross	266.2 lb (falls in 2 <sup>nd</sup> range)	266.2 lb (falls in 2 <sup>nd</sup> range)	266.2 lb (falls in 2 <sup>nd</sup> range)
Tare	53.44 lb (falls in 1 <sup>st</sup> range)	53.4 lb (falls in 2 <sup>nd</sup> range)*	53.5 lb (falls in 2 <sup>nd</sup> range)
Net	212.76 lb (actual weight)	212.8 lb	212.7 lb
Loss	0.0 lb	0.04 lb (consumer's loss)	0.06 lb (store's loss)

A multiple range scale is viewed as two separate scales even though it has two or more weighing ranges with different maximum capacities and different scale intervals, each extending from zero to its maximum capacity all on the same load receptor. A multiple range scale is basically multiple scales in one housing. Current practices do not allow rounding of tare to zero with completely separate scales when the results of weighments on both scales are used to determine the gross, net, and tare weight. Indicators totalizing multiple weighing elements are required to calculate the total weight based on the smallest scale division to eliminate problems with inaccurate net weights.

### *Conclusion*

SWMA agreed that if the real issue is protecting both the retailer and the consumer perhaps what should be looked at is: (1) the suitability of the scale division based on unit price and/or application, (2) limiting the multiple of the scale division difference between the weighing ranges, (3) reducing the allowable tolerance, and (4) limiting the initial determination of the tare, gross, and net to the same weighing range.

SWMA believes all multiple range scales currently evaluated by NTEP should not round tare down when changing to a higher scale division. For over ten years, the NTEP checklist test criteria for multiple range and multi-interval devices in NCWM Publication 14 has always been that tare will round up to the nearest scale division.

### **320-6 N.1.3.1. Bench or Counter Scales, N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers, and Appendix D; Definitions of Bench Scale and Counter Scale**

**Source:** Carryover Item 320-3. (This item originated from the National Type Evaluation Technical Committee (NTETC) Weighing Sector and first appeared on the Committee's 2005 agenda.)

**Recommendation:** Delete Paragraph N.1.3.1. and renumber subsequent paragraphs.

### **N.1.3. Shift Test.**

~~**N.1.3.1. Bench or Counter Scales.**—A shift test shall be conducted with a half capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element.~~

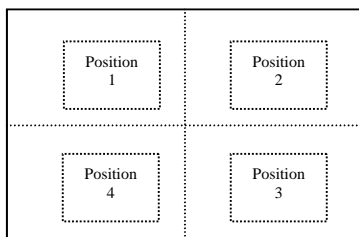
Renumber and amend Paragraph N.1.3.8. as follows:

**N.1.3.87. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers.** A shift test shall be conducted using the following prescribed test loads and test patterns. A single field standard weight used as the prescribed test load shall be applied centrally in the prescribed test pattern. When multiple field standard weights are used as the prescribed test load, the load shall be applied in a consistent pattern in the shift test positions throughout the test and applied in a manner that does not concentrate the load in a test pattern that is less than when that same load is a single field standard weight on the load-receiving element.

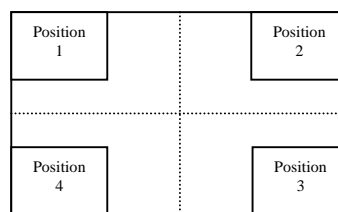
- (a) For scales with a nominal capacity greater than 500 kg (1000 lb), a shift test may be conducted by either using a one-third nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1 below, or by using a one-quarter nominal capacity test load centered as nearly as possible, successively, over each corner of the load-receiving element using the prescribed test pattern as shown in Figure 2 below.
- (b) For scales with a nominal capacity of 500 kg (1000 lb) or less, a shift test shall be conducted using a one-third nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1 below.
- (c) For livestock scales, ~~the~~ shift test load shall be conducted using either a test load of one half nominal capacity provided that the test load does not exceed one-half the rated section capacity or one-half the rated concentrated load capacity, whichever is applicable. ~~A shift test shall be conducted using either:~~ The test load shall be centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1 below, or one-quarter the rated section capacity or one-quarter the rated concentrated load capacity load centered as nearly as possible, successively over each corner of the load-receiving element using the prescribed test pattern as shown in Figure 2 below.
- ~~(a) A one-quarter nominal capacity test load centered as nearly as possible, successively over each main load support as shown in the diagram below; or~~
- ~~(b) A one-half nominal capacity test load centered as nearly as possible, successively at the center of each quarter of the load-receiving element as shown in the diagram below.~~
- (Amended 1987, ~~and~~ 2003, ~~and~~ 200X)

Delete the diagrams that correspond to existing Paragraphs N.1.3.8.(a) and (b) and add new Figures 1 and 2 to correspond with proposed revisions to N.1.3.8. as follows:

**Figure 1**



**Figure 2**



(Added 2003)

**(Amended 200X)**

Delete Appendix D definitions for “bench scale” and “counter scale” as follows:

**~~bench scale.~~** See “~~counter scale.~~”[2.20]

**~~counter scale.~~** One that, by reason of its size, arrangement of parts, and moderate nominal capacity, is adapted for use on a counter or bench. Sometimes called “~~bench scale.~~”[2.20]

**Discussion:** The proposal is intended to clarify the appropriate shift test pattern and test loads for scales currently designated as bench/counter scales and other platform-type scales. Currently, bench and counter scale shift tests are conducted with a one-half capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element. Other platform scale shift tests are conducted with a one-half capacity test load centered, as nearly as possible, successively at the center of each quadrant. The proposal eliminates references to bench and counter scales and instead prescribes that the shift test load and test pattern used for those and all scales other than livestock be based on the scale's nominal capacity. For livestock scales the proposal further clarifies, but does not change, the existing requirements for shift tests.

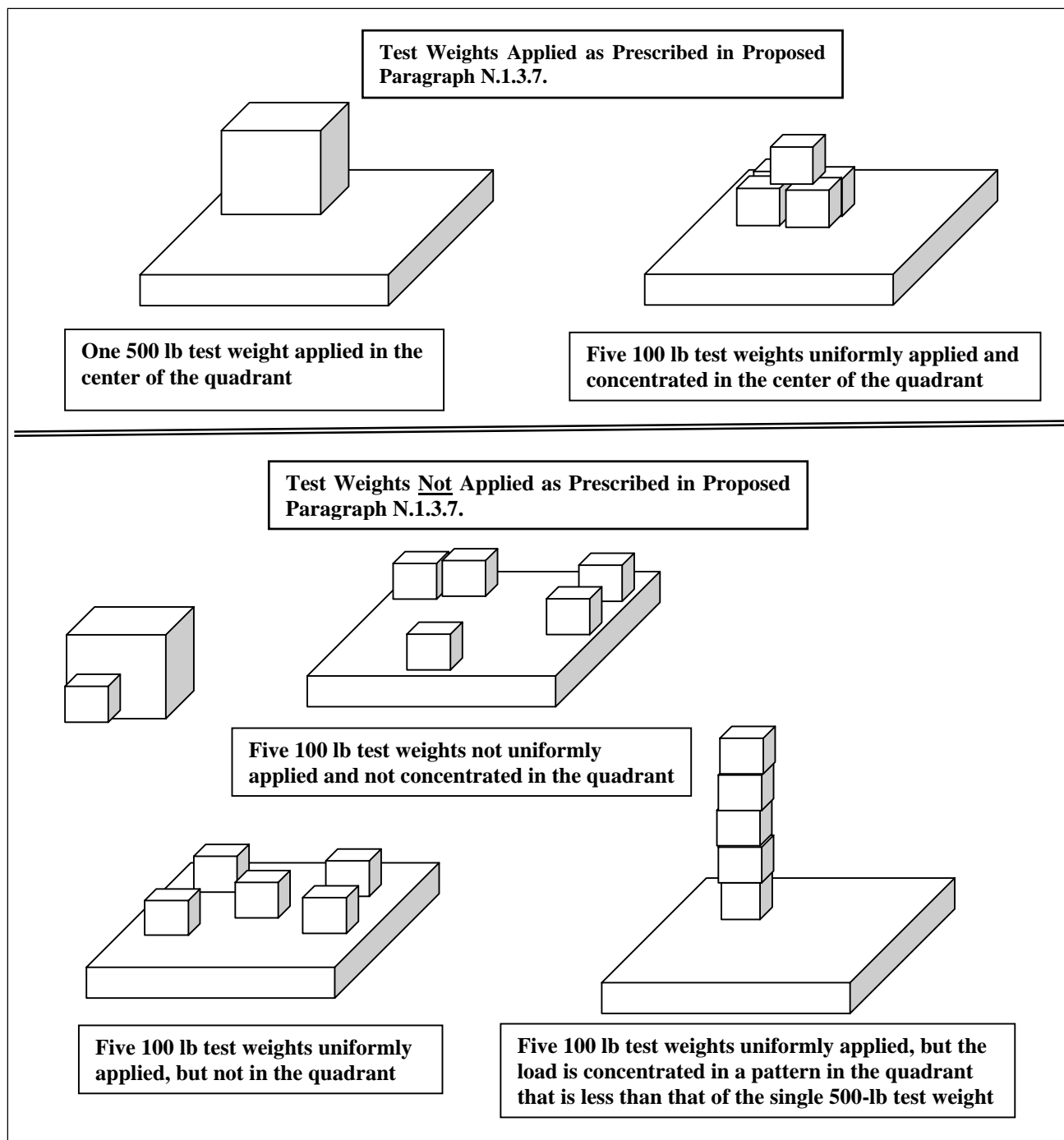
In 2005, the proposal was kept on the agenda as an information item in response to comments indicating that data should be collected on shift tests to verify that the proposed test loads and positions are equivalent to existing test patterns and allow the data to be reviewed by the Weighing Sector, NIST, and the NTEP laboratories.

During the 2006 NCWM Interim Meeting, the Committee received data for shift tests conducted using current shift test requirements and shift tests conducted using the proposed test requirements on the same scales. The NIST technical advisor to the Weighing Sector provided a summary of data gathered by multiple jurisdictions on 207 scales demonstrating that the proposed procedures (i.e., shift test loading pattern and the amount of test weights) based on scale capacity are adequate for use to determine that an instrument with load points of any design configuration can meet performance tolerances during off-center loading. There was no demonstrated difference in scale performance based on the location of the scale, thus the terms "bench" and "counter" should be eliminated. In response to that data, comments were received from the public and private sectors in support of the proposal. SMA also supported the proposal.

NIST WMD supported the intent of the proposal with two changes to clarify what is meant by one-third nominal capacity and the proper placement of test weights to avoid overloading load bearing points. WMD recommended language that specifies the test load at one-third capacity shall not be less than 30 % or greater than 35 % of scale capacity. WMD also noted inconsistencies in the manner in which weights are distributed within the test pattern during shift tests; therefore, it also recommended including language in renumbered Paragraph N.1.3.7. that specifies "when multiple test weights are used, the load shall not be concentrated in a test pattern smaller than that which a single weight would occupy."

Consequently, the Committee modified the entire proposal, Parts (a) through (c), to include language that is technically correct and consistent in its description of how to conduct a shift test on all types of scales. The Committee modified the language to: (1) clarify what defines "acceptable" weight values for a test load that is one-third of the scale's nominal capacity, (2) ensure uniform procedures are followed when applying test weights on the load-receiving element, and (3) eliminate instances where test weights are concentrated in a pattern that overload the load bearing points as illustrated in the example below.

Consider an example of a livestock scale with a section capacity of 1000 lb: a shift test is performed as shown in Figure 1 using a test load of 500 lb. While 100 lb test weights are not commonly used or available, they are used in this example to illustrate the concept of uniformity when applying a test load in a specified pattern on the load-receiving element.



**Figure 1: Application of Test Weights**

The Committee agreed there was sufficient data to present the proposal for a vote at the July 2006 NCWM Annual Meeting since it received no data indicating there were problems with the proposed shift test procedures.

At the 2006 NCWM Annual Meeting, the Committee addressed concerns about the lack of a guideline for a minimum test load and the extensive nature of modifications to livestock scale requirements. The Committee explained that it had only reorganized the livestock scale requirements. The Committee further modified proposed new Paragraph (c) to specify a minimum shift test load of one-half nominal capacity to ensure sufficient test weights are used during the test. Industry acknowledged that although the shift test loads for other scale types was reduced from one-half to one-third, the

rated nominal capacity specified in the newly proposed test load patterns for the lighter test load could sometimes create a more stringent test of the scale's performance.

The Committee heard concerns that substantive changes were made to livestock scale requirements and it should revisit earlier proposed language. The vote on the item did not yield a sufficient number of positive or negative votes for the item to be accepted or defeated and, therefore, the proposal was returned to the Committee for further action. The Committee asks jurisdictions to carefully review the consistency that exists between the proposed language and current Handbook 44 requirements for livestock scales and to provide input on alternate language that might be more appropriate and/or further clarify the shift tests and test loads for these devices.

The WWMA S&T Committee had the opportunity to review an alternate proposal that was to be presented to the NTETC Weighing Sector in September 2006. The WWMA S&T Committee liked the direction of the Weighing Sector alternate proposal, which clarifies shift tests procedures in livestock scale applications, addresses shift test patterns for circular platforms, and eliminates some of the redundant text. Since the Weighing Sector members would not have the opportunity to review and agree on the alternate language until after the WWMA conference, WWMA recommended the proposal as an information item.

CWMA supports the proposal, but recommends an alternate proposal to modify and renumber Paragraph N.1.3.8.(b) to read as follows:

**N.1.3.87. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers.**

**(b) For scales with a nominal capacity of 500 kg (1000 lb) or less, a shift test shall be conducted using up to 50 % nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 50 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1 below.**

CWMA developed this alternate recommendation for modifying and renumbering Paragraph N.1.3.8.(b) that is intended to allow jurisdictions more flexibility in using their existing weights.

Based on the comments received during the 2006 NCWM Annual Meeting, the NIST technical advisor to the Weighing Sector amended the proposal as summarized below to:

- (1) Make it clear that no significant changes are being made to two-section livestock scales;
- (2) Simplify the language for the shift test on "Other" scales;
- (3) Group the livestock scale shift test requirements together;
- (4) Change the order of the "test notes" so that the more common type of scales are listed first; and
- (5) Include minor editorial suggestions on existing language.

The Weighing Sector considered this alternate proposal along with a comment solicited from the PTB and one industry consultant indicating there is a higher risk of overloading one of the (multiple) supports by using a one-half capacity load in an eccentric loading test pattern than by using a one-third capacity load. This appears to stem from the difference in test method between Handbook 44 and OIML R 76. In other words, Handbook 44 more or less assumes a rectangular platform and places the load at a point on a line halfway from the center to the edge as illustrated in Figure 1.

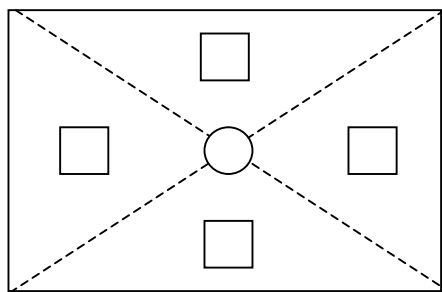


Figure 1: NIST Handbook 44 Shift Test at One-Half Capacity

OIML R 76 recognizes that platforms exist in other shapes (e.g., square, triangular, or circular platforms) as illustrated in Figure 2.

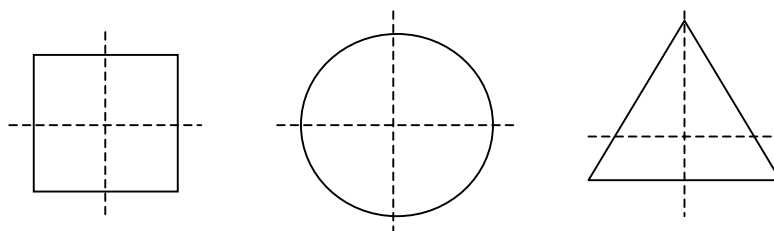


Figure 2: OIML R 76 – Quadrants shown for platforms of devices with four or fewer points of support

Thus, since OIML R 76 depends more on placing the eccentric load in a prescribed section of the total area of the platform rather than on a specific line, they more or less trust the load will be placed at the center of the quadrant according to the figures illustrated in OIML R 76 for scales with four or fewer supports. The end result of both methods, especially for rectangular platforms, is more or less the same.

During the subsequent discussions, several Weighing Sector members stated that the proposed language was unnecessary since there was no technical justification to change the current language in Handbook 44. Additionally, the proposed language would prohibit weights and measures officials from using one-half capacity even though the scale could be weighing loads up to one-half scale capacity that are not in the center of the platform. In contrast, the NIST technical advisor stated that there was no technical reason to use procedures different than those in R 76. (Note: Manufacturers have stated in past discussions that they have to adjust the scales differently for scales intended for North America and scales intended for countries that adopt OIML recommendations.)

Another industry consultant cited text from the 1915 edition of the precursor to Handbook 44 (see Section 10 for Counter Balances and Scales page 19), noting that the shift test loads and positions have not changed in 91 years.

Measurement Canada reported that the proposal to amend Handbook 44 would be in conflict with their current requirements, however, in the past they have indicated a commitment to align their requirements with OIML R 76.

One scale manufacturer reminded the Sector that the test load positions were also changed in the proposal and that the proposed change to one-third scale capacity puts a different torque on the load cell that is roughly equivalent to current forces when using current Handbook 44 test loads and positions.

Based on a vote of 11 in favor and 8 against withdrawing the proposal to amend current Handbook 44 shift test procedures and shift test loads, the Weighing Sector agreed to withdraw their support for the proposal and recommends that the proposal be withdrawn from the Committee's agenda.

NEWMA supports the proposal.

SWMA recommends withdrawing this proposal from the S&T Agenda, but provided no rationale for this position.

For more background information, refer to the Committee's 2005 and 2006 Final Reports.

#### **320-7 N.1.3.6.1. Dynamic Monorail Weighing Systems**

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** Modify Paragraph N.1.3.6.1. as follows:

**N.1.3.6.1. Dynamic Monorail Weighing Systems.** - Dynamic tests with livestock carcasses should be conducted during normal plant production to duplicate actual use conditions. No less than 20 test loads using carcasses or portions of carcasses of the type normally weighed should be used in the dynamic test; ~~two additional test loads may be included in the test run for use in the event that one or two test loads are rendered unusable during the dynamic test. Prior to starting the dynamic test, the test carcasses must be positioned far enough ahead of the scale so that their swaying motion settles to duplicate the normal sway of a continuously running plant chain.~~ If the plant conveyer chain does not space or prevent the carcasses from touching one another, dynamic tests should not be conducted until this condition has been corrected.

All carcasses shall be individually weighed statically on either the same scale being tested dynamically or another monorail scale with the same or smaller divisions and in close proximity. (The scale selected for weighing the carcasses shall first be tested statically with test weights.)

If the scale being tested is used for weighing freshly slaughtered animals, (often referred to as a "hot scale") care must be taken to get a static weightment as quickly as possible before or following the dynamic weightment to avoid loss due to shrink. If multiple dynamic tests are conducted using the same carcasses, static weights should be obtained before and after multiple dynamic tests. If the carcass changes weight between static tests, the amount of weight change should be taken into account, or the carcass should be disregarded for tolerance purposes.

(**Note:** For a dynamic monorail test, the reference scale shall comply with the principles in the Fundamental Considerations Paragraph 3.2. Tolerances for Standards.)  
(Added 1996) (Amended 1999 and 200X)

SWMA recommends an alternate proposal that further modifies Paragraph N.1.3.6.1. to specify test conditions for the scale selected to weigh the carcasses as follows:

**N.1.3.6.1. Dynamic Monorail Weighing Systems.** - Dynamic tests with livestock carcasses should be conducted during normal plant production to duplicate actual use conditions. No less than 20 test loads using carcasses or portions of carcasses of the type normally weighed should be used in the dynamic test; ~~two additional test loads may be included in the test run for use in the event that one or two test loads are rendered unusable during the dynamic test. Prior to starting the dynamic test, the test carcasses must be positioned far enough ahead of the scale so that their swaying motion settles to duplicate the normal sway of a continuously running plant chain.~~ If the plant conveyer chain does not space or prevent the carcasses from touching one another, dynamic tests should not be conducted until this condition has been corrected.

All carcasses shall be individually weighed statically on either the same scale being tested dynamically or another monorail scale with the same or smaller divisions and in close proximity. (The scale selected for static weighing of the carcasses shall first be tested statically with certified test weights that have been properly protected from the harsh environment of the packing plant to ensure they maintain accuracy.)

If the scale being tested is used for weighing freshly slaughtered animals, (often referred to as a "hot scale") care must be taken to get a static weighment as quickly as possible before or following the dynamic weighment to avoid loss due to shrink. If multiple dynamic tests are conducted using the same carcasses, static weights should be obtained before and after multiple dynamic tests. If the carcass changes weight between static tests, the amount of weight change should be taken into account, or the carcass should be disregarded for tolerance purposes.

**(Note:** For a dynamic monorail test, the reference scale shall comply with the principles in the Fundamental Considerations Paragraph 3.2. Tolerances for Standards.)  
(Added 1996) (Amended 1999 and 200X)

**Discussion:** CWMA supports this item and recommends that it move forward for national consideration. CWMA heard testimony from the USDA Packers and Stockyards Administration indicating the proposal clarifies that the device should be tested while in production and the extra two carcasses referenced in the current language are only for replacement purposes in cases where carcass weight loss occurs as a result of influences other than from the device being tested. The extra carcasses were not intended to replace erroneous or outlying device readings.

SWMA supports the proposal, but recommends further modifications to Paragraph N.1.3.6.1. to specify the test conditions for the static test of the reference scale.

#### **320-8 Table 4. Minimum Test Weights and Test Loads**

**Source:** Carryover Item 320-4. (This item originated from the Northeastern Weights and Measures Association (NEWMA) and first appeared on the Committee's 2006 agenda.)

**Recommendation:** Modify Table 4. Minimum Test Weights and Test Loads as follows:



Table 4. Minimum Test Weights and Test Loads <sup>1</sup>			
Device capacity	Minimums (in terms of device capacity)		(where practicable)
	Test weights (greater of)	Test loads <sup>2</sup>	
0 to 150 kg (0 to 300 lb)	100 %		Test weights to dial face capacity, 1 000 d, or test load to used capacity, if greater than minimums specified  During initial verification a scale should be tested to capacity
151 to 1 500 kg (301 to 3 000 lb)	25 % or 150 kg (300 lb)	75 %	
1 501 to 20 000 kg (3 001 to 40 000 lb)	12.5 % or 500 kg (1 000 lb)	50 %	
20 001 kg+ <u>to</u> <u>250 000 kg</u> (40 001 lb+ <u>to 500 000 lb</u> )	12.5 % or 5 000 kg (10 000 lb)	25 % <sup>3</sup>	
<u>250 001 kg+</u> <u>(500 001 lb+)</u>	<b>12.5 % or 30 000 kg (62 500 lb)</b>	<u>25 %</u> <sup>3</sup>	

<sup>1</sup> If the amount of test weight in Table 4 combined with the load on the scale would result in an unsafe condition, then the appropriate load will be determined by the official with statutory authority.

<sup>2</sup> The term "test load" means the sum of the combination of field standard test weights and any other applied load used in the conduct of a test using substitution test methods. Not more than three substitutions shall be used during substitution testing, after which the tolerances for strain load tests shall be applied to each set of test loads

<sup>3</sup> The scale shall be tested from zero to at least 12.5 % of scale capacity using known test weights, and then to at least 25 % of scale capacity using either a substitution or strain load test that utilizes known test weights of at least 12.5 % of scale capacity. Whenever practical, a strain load test should be conducted to the used capacity of the scale. When a strain load test is conducted, the tolerances apply only to the test weights or substitution test loads.  
(Amended 1988, 1989, 1994, and 2003)

[**Note:** GIPSA requires devices subject to their inspection to be tested to at least “used capacity,” which is calculated based on the platform area of the scale and a weight factor assigned to the species of animal weighed on the scale. “Used capacity” is calculated using the formula:

Used Scale Capacity = Scale Platform Area x Species Weight Factor

Where species weight factor = 540 kg/m<sup>2</sup> (110 lb/ft<sup>2</sup>) for cattle, 340 kg/m<sup>2</sup> (70 lb/ft<sup>2</sup>) for calves and hogs, and 240 kg/m<sup>2</sup> (50 lb/ ft<sup>2</sup>) for sheep and lambs]

**(Amended 200X)**

**Discussion:** Field officials are faced with determining the minimum test load necessary to verify the performance of scales with nominal capacities that exceed 1 000 000 lb. Since January 2006, the Committee has considered several proposed modifications to Table 4., which included listing the minimum and maximum test weights and test loads for devices with capacities that exceed 500 001 lb. However, this action has not resulted in any new guidelines beyond the existing minimum test load requirements in Table 4.

The Committee further acknowledged that officials might have difficulty placing the recommended minimum 25 % test load on some load-receiving elements such as railway track scales with two small platforms with a dead space between them because this configuration limits the size of each platform. Consequently, the Committee agreed that until the submitter develops alternate language and data to justify specific minimum load requirements that warrant a change to existing Handbook 44 requirements, the proposal should remain an information item.

WWMA discussed the proposal and heard one comment that recommended the proposal specify only 62 500 lb of minimum test weights in the proposed new device capacity range that exceeds 500 001 lb. WWMA believes that the carryover proposal does not change the requirements in Table 4., even though the proposed text specifies the amount of

test weights for scale capacities that exceed 500 000 lb. WWMA also believes that data may be needed to demonstrate what is an adequate amount of test weight for scales with capacities that exceed 500 000 lb. Consequently, WWMA recommends that the proposal should be withdrawn.

CWMA recommends that this proposal be withdrawn.

NEWMA recommends that NIST Handbook 44 provide flexible guidelines for determining the minimum acceptable test load when testing high capacity scales. At its October 2006 meeting, NEWMA developed an alternate proposal which modifies Table 4. to address devices with a capacity up to 500 000 lb and to allow some flexibility by eliminating the last column where there are conditions that dictate, when it is practical, the use of a specified amount of test weight.

NEWMA recommends Table 4. be modified as follows:

Table 4. Minimum Test Weights and Test Loads <sup>1</sup>			
Device capacity	Minimums (in terms of device capacity)		(where practicable)
	Test weights (greater of)	Test loads <sup>2</sup>	
0 to 150 kg (0 to 300 lb)	100 %		<del>Test weights to dial face capacity, 1 000 d, or test load to used capacity, if greater than minimums specified</del>  During initial verification, a scale should be tested to capacity
151 to 1 500 kg (301 to 3 000 lb)	25 % or 150 kg (300 lb)	75 %	
1 501 to 20 000 kg (3 001 to 40 000 lb)	12.5 % or 500 kg (1 000 lb)	50 %	
20 001 kg+ <u>to</u> <u>250 000 kg</u> (40 001 lb+ <u>to 500 000 lb</u> )	12.5 % or 5 000 kg (10 000 lb)	25 % <sup>3</sup>	
<u>250 001 kg (500 001 lb)</u>	12.5 % or 30 000 kg (62 500 lb)	<u>25 %<sup>3</sup></u>	

<sup>1</sup> If the amount of test weight in Table 4 combined with the load on the scale would result in an unsafe condition, then the appropriate load will be determined by the official with statutory authority.

.  
. .  
. .

Where species weight factor = 540 kg/m<sup>2</sup> (110 lb/ft<sup>2</sup>) for cattle, 340 kg/m<sup>2</sup> (70 lb/ft<sup>2</sup>) for calves and hogs, and 240 kg/m<sup>2</sup> (50 lb/ ft<sup>2</sup>) for sheep and lambs]

### 320-9 Appendix D; Definitions for Tare Mechanism, Gross Weight Value, Net Weight, Net Weight Value, Tare, and Tare Weight Value

**Source:** National Type Evaluation Technical Committee (NTETC) Weighing Sector

**Recommendation:** Modify the definition for “tare mechanism” and add new definitions for “gross weight value,” “net weight,” “net weight value,” “tare,” and “tare weight value” to Appendix D.

Amend the following definition for “tare mechanism:”

tare mechanism. A mechanism (including a tare bar) designed for determining or balancing out the weight of packaging material, containers, vehicles, or other materials that are not intended to be included in net weight determinations and setting the indication to zero when the tare object is on the load-receiving element:

1. by reducing the weighing range for net loads [e.g., subtractive tare where 15 kg Gross Weight – 5 kg Tare Weight = 10 kg maximum Net weight], or

2. without altering the weighing range for net load on mechanical scales [additive tare mechanism (e.g., tare bar on a mechanical scale with a beam indicator)].

The tare mechanism may function as:

1. a non-automatic mechanism (load balanced by an operator),
2. a semi-automatic mechanism (load balanced automatically following a single manual command),
3. an automatic mechanism where the load is balanced automatically without the intervention of an operator. An automatic tare mechanism is only suitable for indirect sales to the customer (e.g., prepackaging scales).

[2.20, 2.24]

Add the following new definitions to Appendix D:

gross weight value. Indication or recorded representation of the weight of a load on a weighing device, with no tare mechanism in operation.[2.20, 2.24]

net weight. See the current edition of NIST Handbook 130 Uniform Weights and Measures Law Section 1.10.  
[2.20, 2.24]

net weight value. Indication or recorded representation of the weight of a load placed on a weighing device after the operation of a tare mechanism. [2.20, 2.24]

tare. The weight of packaging material, containers, vehicles, or other materials that are not intended to be part of the commodity included in net weight determinations. [2.20, 2.24]

tare weight value. The weight value of a load determined by a tare mechanism. [2.20, 2.24]

In addition to the above proposed changes SWMA also recommends adding the complete NIST Handbook 130 definition for "net weight" to Appendix D as follows:

net weight. The term "net mass" or "net weight" means the weight of a commodity excluding any materials, substances, or items not considered to be part of the commodity. Materials, substances, or items not considered to be part of the commodity include, but are not limited to, containers, conveyances, bags, wrappers, packaging materials, labels, individual piece coverings, decorative accompaniments, and coupons, except that, depending on the type of service rendered, packaging materials may be considered to be part of the service. For example, the service of shipping includes the weight of packing materials. [2.20, 2.24]

**Discussion:** This Weighing Sector proposal is the one of several proposed modifications to Handbook 44 requirements intended to clarify the acceptable tare features already recognized for use in commercial applications. Scales Code requirements do not include sufficient detailed language that identifies all types of tare, defines how tare features must operate, or specifies the net and tare values a scale must indicate and record. Current NIST Handbook 44 requirements that address tare include Paragraphs S.2.1.6. Combined Zero-Tare ("0/T") Key, S.2.3. Tare, S.2.3.1. Monorail Scales Equipped with Digital Indications, and T.N.2.1. General (Tolerances).

The Weighing Sector has developed criteria used to type evaluate tare features based on General Code Paragraph G-S.2. Facilitation of Fraud and other requirements that apply to indicating and recording elements and recorded representations. NTEP laboratories find that it has become increasingly difficult to solely base its compliance decisions on Paragraph G-S.2. because the general nature of the language results in multiple interpretations. Type evaluation criteria are published in NCWM Publication 14, however, this document is not in wide distribution in the weights and measures community. Also, only a limited number of weights and measures officials, device manufacturers, and device owners and operators are regular participants in Weighing Sector meetings where tare evaluation criteria are developed and discussed. Additionally, it is difficult for parties responsible for the design, use, and test of the tare feature to interpret and apply technical requirements published in Publication 14. This results in differing interpretations of Handbook 44 requirements.

In 2006, the NTETC Weighing Sector formed a Tare Work Group to review existing tare requirements and make recommendations about how tare is to operate on a single range scale, multiple range scale, and multi-interval scale. The work group also was asked to develop, where necessary, recommendations for changes to Publication 14, Handbook 44, and Handbook 130, and to provide guidance to the Weighing Sector on type evaluation requirements.

The work group is currently developing proposals to amend Handbook 44 requirements to: (1) ensure that a tare feature operates in a manner that increases the accuracy of net weight determinations, (2) clearly state what information and values are permitted and required for indicated and recorded representations of net weight and tare weight, and (3) identify the types (e.g., semiautomatic and stored) of tare weight values that are determined at the time objects are weighed or tare weight values are determined prior to the time objects are weighed. At its 2006 meeting, the Weighing Sector agreed to submit a proposal the NCWM S&T Committee to amend Handbook 44 Appendix D by amending the term "tare mechanism" and adding new tare definitions to ensure a uniform understating of the terminology used in Handbook 44.

SWMA supports the proposal, but also believes the wording to the definition for "net weight" should appear in Appendix D rather than have the reader refer to NIST Handbook 130 for that information. Consequently, SWMA recommends adding the complete definition of "net weight" to the proposal as shown in the recommendation above.

## **324 AUTOMATIC WEIGHING SYSTEMS**

### **324-1 S.1.2. Value of Division Units and T.2.1. General**

**Source:** National Type Evaluation Technical Committee (NTETC) Weighing Sector

**Recommendation:** Add a new note to Paragraph S.1.2. and amend Paragraph T.2.1. as follows:

**S.1.2. Value of Division Units.** - The value of a division  $d$  expressed in a unit of weight shall be equal to:

- (a) 1, 2, or 5; or
- (b) a decimal multiple or submultiple of 1, 2, or 5.

**Note: The requirements that the value of the scale division be expressed as 1, 2, or 5, or a decimal multiple or submultiples of 1, 2, or 5 does not apply to net weight value that are calculated from gross and tare weight indications where the scale value of the gross weight is different from the scale value of the tare weight(s) on multi-interval or multiple range scales. For example, a scale indicating in 2 g divisions in the lower range or segment and 5 g divisions in the higher range or segment may result in net values ending in three (3) or eight (8).**

**(Amended 200X)**

**T.2.1. General.** – The tolerance values are positive (+) and negative (-) with the weighing device adjusted to zero at no load. When tare is in use, the tolerance values are applied from the tare zero reference (**zero net indication**); the tolerance values apply to the **net weight indication for every possible tare load using** certified test loads **only**.  
**(Amended 200X)**

In addition to the above proposed changes, SWMA recommends the Committee also consider modifying Paragraph S.2.2. as follows:

**S.2.2. Tare.** - On any automatic weighing system the value of the tare division shall be equal to the value of the scale division. The tare mechanism shall operate only in a backward direction (i.e., in a direction of underregistration) with respect to the zero-load balance condition of the automatic weighing system. A device designed to automatically clear any tare value shall also be designed to prevent the automatic clearing of tare until a complete transaction has been indicated.

**Note:** On a computing automatic weighing system, this requires the input of a unit price, the display of the unit price, and a computed positive total price at a readable equilibrium. Other devices require that a transaction or lot run be completed.

**Note: This requirement does not apply to multi-interval scales or multiple range scales when the value of tare is determined in a lower range.**  
(Amended 2004 and 200X)

**Discussion:** In 2006, the NTETC Weighing Sector formed a Tare Work Group to review existing tare requirements, and make recommendations about how tare is to operate on a single range scale, multiple range scale, and multi-interval scale. The work group was also asked to develop, where necessary, recommendations for changes to Publication 14, Handbook 44, and Handbook 130, and to provide guidance to the Weighing Sector on type evaluation requirements.

This proposal, which was developed by the Tare Work Group and is supported by the Weighing Sector, adds a new note to Paragraph S.1.2. The note recognizes display and printing of net weight values in divisions other than the scale division used in the display of gross weight, resulting in a more accurate net weight determination.

The proposal also amends Paragraph T.2.1. to clarify that tolerances also apply to net weight indications regardless of the gross load on the scale. The Tare Work Group reviewed OIML R 76 "Nonautomatic Weighing Instruments" for corresponding requirements and to determine if there were areas where Handbook 44 could be aligned with international recommendations. Based on that review, the work group agreed that Handbook 44 Paragraph T.2.1. should be modified to state that tolerances also apply to net load indications.

The Tare Work Group discussed problems associated with determining the appropriate direction to round tare on multi-interval scales and multiple range scales whenever gross and tare weights fall in different weighing segments on a multi-interval scale or in different weighing ranges on multiple range scales. In these cases, the scale division size for the gross and tare weights differ; however, the net weight must be in mathematical agreement with the gross and tare weights that are indicated and recorded by the device (i.e., gross weight - tare weight = net weight).

The problem arises when the tare weight is rounded up to the next larger scale division, where the net weight falls in the higher segment or range. For example, a 0.004 lb tare weight in a weighing range or segment with 0.002 lb intervals in the lower weighing range or segment may round to zero when the net weight falls in the upper weighing range with 0.01 lb intervals:

$$\begin{array}{r} 10.05 \text{ lb Gross Weight} \\ - 0.004 \text{ lb Tare Weight} \\ \hline = 10.046 \text{ lb the Mathematically Correct Net Weight;} \end{array}$$

However, due to rounding the device indicates 10.05 lb Net Weight

This results in a transaction where a commodity is bought or sold on the basis of gross weight or when an insufficient amount of tare weight is taken and results in a misrepresentation of net weight for the transaction.. Essentially, the rounding of tare that falls in a smaller division in either direction (e.g., a 0.015 lb. tare weight rounded down to zero or to 0.01 lb or up to 0.02 lb) provides a less accurate net weight.

The Tare Work Group developed a corresponding proposal for the Scales Code to clarify the appropriate scale division values and the application of tolerances to tare weights for those devices (See S&T Item 320-3).

SWMA supports the recommendation; however, SWMA also agreed that an additional note should be added to Paragraph S.2.2. Tare as shown in the recommendation above to eliminate any conflict with proposed changes to Paragraph S.1.2. The new note proposed for Paragraph S.2.2. clarifies that the requirement does not apply to multi-interval scales or multiple range scales when tare is determined in the lower range of those scales.

### 324-2 Note 5 Table S.7.b. Notes for Table S.7.a.; Temperature Range

**Source:** National Type Evaluation Technical Committee (NTETC) Weighing Sector

**Recommendation:** Amend Note 5 in Table S.7.b. as follows:

5. Required only on automatic weighing systems if the temperature range on the NTEP CC is ~~other~~ narrower than and within –10 EC to 40 EC (14 EF to 104 EF).  
(Amended 200X)

SWMA recommends including a new Paragraph T.2.X. Subsequent Verification Examination that was inadvertently overlooked by the Weighing Sector as follows:

**T.2.X. Subsequent Verification Examination. – For subsequent verification examinations, the tolerance values apply regardless of the influence factors in effect at the time of the conduct or the examination. (Also see G-N.2.)**

**Background/Discussion:** Periodically questions arise about whether or not a device is suitable for field operation based on the limited temperature range the device is subjected to under type evaluation. In other cases a device's suitability is questioned when the temperature limits marked on the device were narrower or wider than –10 °C to 40 °C (14 °F to 104 °F) temperature range. In 2005, the NTETC Weighing Sector established a policy where its laboratories only will test and issue approvals over the –10 °C to 40 °C (14 °F to 104 °F) temperature range because of the limitations of its environmental chambers and safety concern for laboratory staff working in high temperature environments. In 2006, the Weighing Sector asked for the Committee's interpretation of how to apply temperature limits given the climatic conditions developed in the laboratory and those that exist in real-world environments.

Most NIST Handbook 44 Section 2 and Section 5 device codes include requirements for marking equipment with temperature limits. Many of those codes include specific conditions for marking a temperature range on commercial equipment. Weighing devices are required to perform within tolerance over the temperature range of –10 °C to 40 °C (14 °F to 104 °F). The temperature range of –10 °C to 40 °C was selected as the low and high climatic limits of operation to: (1) align U.S. and International Organization of Legal Metrology (OIML) environmental conditions for performance tests, (2) keep within a range that represents at least 80 % of the climatic conditions for meeting performance requirements in military specifications for electronic equipment, and (3) duplicate the conditions typically found in most outdoor environments. Current OIML recommendations for temperature test levels for electronic equipment are left to each nation based on the severity of climatic conditions where the instrument is typically in use.

In 1991, the NCWM S&T Committee provided guidelines on how to apply temperature range marking requirements and the appropriate use of a scale that is marked for use in a temperature range narrower or wider than –10 °C to 40 °C. Device manufacturers are required to mark the equipment's working temperature range when it is narrower or wider than –10 °C to 40 °C. Device codes also specify the minimum difference between the lower and upper limits of the temperature range based on the device's accuracy class.

The following text is excerpted from the 1991 Final Report S&T Item 320-3 and includes the Committee's interpretation on marking requirements for temperature ranges on scales that should be included in the training modules for scales:

*Temperature Range of –10 °C to 40 °C (14 °F to 104 °F):*

This case has two parts. The conclusion is the same whether or not the temperature range is marked on the device.

If temperature range is not marked on the scale, the device must be accurate over the range of –10 °C to 40 °C (14 °F to 104 °F). If a temperature range is not marked on a device with an NTEP Certificate of Conformance, it was tested over a temperature range of –10 °C to 40 °C (14 °F to 104 °F). The device may be used outside the specified temperature range, but the device must be accurate in the environment in which it is used, since Scales Code Paragraph T.N.2.3. Subsequent Verification Examination applies.

If a device is marked with a temperature range of  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ ), the marking is not considered to be a limitation to its application. The device may be used outside the specified temperature range, but the device must be accurate in the environment in which it is used since Scales Code Paragraph T.N.2.3. Subsequent Verification Examination applies. The marking of the temperature range  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ ) is optional.

*Marked Temperature Range Less Than  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ ):*

If a device is marked with a temperature range less than  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ ), then the environment in which the device is used must be evaluated to determine if the device is suitable for use in that application. The device cannot be used in an environment in which the temperatures exceed the temperature limits marked on the device.

*Marked Temperature Range Greater Than  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ ):*

If a device is marked with a temperature range greater than  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ ) this indicates a scale of higher quality than a scale without a temperature marking for devices within the same accuracy class and of the same scale division value. This fact may be used as a marketing tool in the same manner as the maximum number of scale divisions,  $n_{\text{max}}$ . A scale marked with a wider temperature range is tested during type evaluation over the marked temperature range.

No changes were made to Handbook 44 temperature marking requirements until 1998 when the Weighing Sector identified a discrepancy between Handbook 44 and Publication 14 National Type Evaluation Program Administrative Procedures, Technical Policy, Checklists, and Test Procedures in the requirement for marking temperature ranges on scales. Handbook 44 required that Class III, III L, and IIII devices be marked with a temperature range if the temperature limits are *other* than  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ ). However, some sections of Publication 14 stated that these devices must be marked with a temperature range if the temperature range is *narrower* than  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ ).

In 1998, the Weighing Sector discussed instances where it is permissible to use a device if the device is marked with a specific temperature range or a range is listed on a CC. The Sector agreed that, if possible, the requirement should harmonize with OIML. OIML R 76 Clause 3.9.2.1. Prescribed Temperature Limits states, "If no particular working temperature is stated in the descriptive markings of an instrument, this instrument shall maintain its metrological properties within the following temperature limits:  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ )."

Subsequently, the Committee considered a proposal to modify Scales Code Table S.6.3.a. Note 5 to correct the discrepancy. A proposal was heard to modify Table S.6.3.b. Notes for Table S.6.3.a., Note 5. to read as follows:

5. *Required only on Class III, III L, and IIII ~~scales~~ devices if the temperature range on the NTEP CC is ~~other~~ narrower than and within  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $104^{\circ}\text{F}$ ).  
[Nonretroactive as of January 1, 1986]*

The Committee agreed that although the modifications to Note 5 are less restrictive, they appear to more adequately describe the temperature marking requirements and eliminate any conflict between Handbook 44 and Publication 14. During the 1999 Annual Meeting, hearing no unfavorable comments on this proposal, the Conference adopted the item, and it remains the same today.

In 2006, the Sector also questioned why requirements that address instances where equipment operates in temperatures outside of the  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  temperature range such as Scales Code Paragraph T.N.2.3. Subsequent Examination Verification are not included in all weighing device codes. The Sector also noted there are inconsistencies in the language that specifies temperature requirements throughout the weighing device codes. The Weighing Sector agreed this is an important issue, yet it gave the Committee time to research the codes and policies established on this topic. Consequently, the Weighing Sector request became a developing item on the Committee's agenda.

The Weighing Sector agreed that no evaluation would be conducted for temperature ranges outside of laboratory capabilities, which are  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  while it awaits input from the Committee. The Weighing Sector's *ad hoc* policy is contrary to an earlier 1991 NTEP policy where NTEP agreed to require testing to demonstrate compliance with the

manufacturer's specified temperature range, including accepting data from recognized and approved laboratories for tests performed at temperature ranges that exceeded the -10 °C to 40 °C temperature range.

At their fall 2006 meetings, the regional weights and measures associations reviewed the proposal in its former status as a Developing Item (Part 4, Item 1) that did not include any recommendation to modify Handbook 44. WWMA agreed the proposal is predominantly a type evaluation laboratory issue and should be considered at the next meeting of the Automatic Weighing System Work Group. WWMA may revisit the issue at a later date if it is deemed necessary to modify Handbook 44 to adequately address temperature requirements. WWMA recommends the issue remain a developing item while the NCWM S&T Committee and Weighing Sector develop a position that can be published for review.

CWMA recommends that the Automatic Weighing Systems Code reflect NIST Handbook 44 Scales Code T.N.8. Influence Factors. NEWMA supports the CWMA recommendation.

At the conclusion of its 2006 meeting, the Weighing Sector agreed that the NIST technical advisor would prepare and submit to SWMA proposed changes to Note 5 as shown in the recommendation above. The Sector agreed that any further changes to other codes should first be evaluated by the appropriate NTETC Sector.

The Weighing Sector believes that its 2005 technical policy defining the scope of temperature testing conducted by NTEP is not in conflict with the 1991 S&T Committee's position since the 1999 modification to Note 5 resulted in a link of the temperature range marking requirement to the range listed on the CC. The Sector also agreed that the CC does not cover devices marked with a larger temperature range than what is listed on the CC. For example, an NTEP CC that lists a temperature range of -5 °C to +30 °C would not cover a device that was not marked with a temperature range or a device marked with a -5 °C to +45 °C temperature range.

The Sector agrees with the concerns from the NTEP laboratories that testing over increasing temperature ranges may become a health and safety issue and that existing temperature chambers are limited in their capabilities to perform temperature tests over wider ranges. Additionally, the Sector recommends the NCWM S&T Committee reconsider amending the Committee's 1991 position on temperature requirements to correspond with the Sector's current marking requirement policy that recognizes health and safety concerns and the limitations of NTEP laboratory testing equipment.

SWMA agreed that the Weighing Sector's proposal should move forward as a voting item on the NCWM S&T Committee's agenda. However, SWMA also recommends including in the proposal a new Paragraph T.2.X. Subsequent Verification Examination that was inadvertently overlooked by the Weighing Sector as shown in the recommendation above.

### **330 LIQUID-MEASURING DEVICES**

#### **330-1 S.1.2.3. Value of the Smallest Unit**

**Source:** Carryover Item 330-2. (This item originated from the National Type Evaluation Technical Committee (NTETC) Measuring Sector and first appeared on the Committee's 2006 agenda.)

**Recommendation:** Modify NIST Handbook 44 Paragraph S.1.2.3. as follows:

**S.1.2.3. Value of Smallest Unit.** – The value of the smallest unit of indicated delivery, and recorded delivery if the device is equipped to record, shall not exceed the equivalent of:

- (a) 0.5 L (~~1 pt~~ 0.1 gal) on ~~retail~~ devices with a maximum rated flow rate of 750 L/min (200 gal/min) or less.
- (b) 5 L (1 gal) on ~~wholesale~~ devices with a maximum rated flow of more than 750 L/min (200 gal/min).

This requirement does not apply to manually operated devices equipped with stops or stroke-limiting means.  
(Amended 1983, ~~and~~ 1986, and 200X)



CWMA recommended a corresponding new user requirement become part of the proposal as follows:

**UR.XX - Value of Smallest Unit. – The value of the smallest unit of indicated delivery, and recorded delivery if the device is equipped to record, shall not exceed the equivalent of:**

**(a) 0.5 L (0.1 gal) on devices with a flow rate of 750 L/min (200 gal/min) or less.**

**(b) 5 L (1 gal) on devices with a flow rate of more than 750 L/min (200 gal/min).**

**(c) 5 L (1 gal) on meters with a rated maximum flow of 375 L (100 gal/min) or more used for aviation turbine fuels.**

**This user requirement allows high-volume meters to sell in 1 gal increments to the end user, and requires 0.1 gal increment deliveries only from meters delivering at less than 200 gal/min. (Added 200X)**

SWMA and the Measuring Sector recommended an alternate proposal to amend Paragraph S.1.2.3. as follows:

**S.1.2.3. Value of Smallest Unit.** - The value of the smallest unit of indicated delivery, and recorded delivery if the device is equipped to record, shall not exceed the equivalent of:

**(a) 0.5 L (~~1 pt~~ 0.1 gal) on ~~retail~~ devices with a maximum rated flow rate of 750 L/min (200 gal/min) or less.**

**(b) 5 L (1 gal) on ~~wholesale~~ devices with a maximum rated flow of more than 750 L/min (200 gal/min).**

**(c) 5 L (1 gal) on meters with a rated maximum flow rate of 375 L (100 gal/min) or more used for jet fuel aviation refueling systems.**

This requirement does not apply to manually operated devices equipped with stops or stroke-limiting means.  
(Amended 1983, 1986, and 200X)

**Background/Discussion:** In 2004 the definition of a “retail device” in NIST Handbook 44 was modified to include all devices used to measure product for the purpose of sale to the end user. At that time, the Committee believed all affected parties were aware of the proposal and there was no opposition to the change. The Committee had not considered applications where very large deliveries are made to the end user, typically at high flow rates. After the 2005 edition of Handbook 44 was published and distributed, NIST WMD received input from a weights and measures jurisdiction that routinely tests large meters used to deliver fuel to fishing fleets and other large ocean-going boats. The jurisdiction stated that the average fuel delivery is approximately 300 000 gal and may be as much as 1 million gal. Prior to the revision of the definition of “retail,” the value of the smallest unit of the indicated delivery for these devices was permitted to be 1 gal. Most of these devices have mechanical registers which make it impractical to have a smallest indicated unit of 0.1 gal at the high flow rates used for such large deliveries. Because the fuel is being delivered to the end user, the jurisdiction believes this is a retail delivery. However, with the revisions to the definition of retail device, Handbook 44 now requires a smallest unit of delivery of not more than 0.5 L (1 pint or 0.125 gal) for these devices.

To remedy this issue the NTETC Measuring Sector developed the original recommendation above. The Measuring Sector believed that, because the maximum flow rate for many applications has increased, 200 gal/min is an appropriate “break point” for determining what the smallest unit of measurement should be.

At the 2006 NCWM Interim Meeting, it was suggested that the Committee revisit the discussion on suitability of liquid-measuring devices that was discussed by NCWM in 1991 through 1993. In these earlier discussions, NCWM was unable to reach a consensus on any changes to NIST Handbook 44, and the item was withdrawn from the Committee's agenda. The Committee was informed that there was interest expressed at the 2005 NTETC Measuring Sector Meeting in developing new criteria addressing suitability as it relates to flow rate, minimum measured quantity (MMQ), and

smallest unit of measure for applications using liquid-measuring devices. The Committee encourages the NTETC Measuring Sector to pursue development of suitability requirements for submission to the Committee for consideration and is interested in input from the weights and measures community on this approach.

During the 2006 NCWM Annual Meeting, the Committee received input from several aircraft refueling equipment manufacturers that there is a safety concern with stationary refueling systems capable of delivering jet fuel through two different size hoses at different flow rates using two different meters. In this scenario, the operators of the refueling facility want both meters to have the same unit of indication, that is, 5 L (1 gal). The Committee understood the concern, but was reluctant to modify the recommendation based on the limited information available at the meeting. The Committee believes the aircraft refueling industry should propose a change during the next Conference cycle through the NTETC Measuring Sector and the regional associations. However, the Committee recognized that a legitimate problem may exist with existing jet aircraft refueling equipment and encourages weights and measures jurisdictions to consider safety implications before taking official action on existing jet aircraft refueling devices that may not meet the requirements of Paragraph S.1.2.3. During the voting session there appeared to be concern that, if this item was adopted, weights and measures officials could be perceived as ignoring safety issues for aircraft refueling. There was lack of support for the proposal without an exemption for jet aircraft refueling; therefore, the Committee changed the status of the proposal from a voting item to an information item to allow sufficient time to address these areas of concern.

At its fall 2006 meeting, CWMA agreed with the original recommendation, but proposed that an accompanying User Requirement also be added to Handbook 44 to address aircraft refueling applications.

At its fall 2006 meeting WWMA discussed the proposed amendment to Paragraph S.1.2.3. and also discussed the issues the aviation industry has when refueling aircraft using a combination of meters that register in 0.1 gal and 1 gal increments. The aviation industry was not present at that meeting, but WWMA was made aware that the aviation industry has safety concerns about under-filling fuel tanks and tanks with an unbalanced load because of misread meter indications. WWMA recognizes industry's concerns but believes this is a training issue for aircraft refuelers. WWMA agreed there is an immediate need to provide guidelines for fishing fleet and similar applications; therefore, it recommends the proposal move forward as written as a voting item.

At their fall 2006 meetings, the NTETC Measuring Sector and SWMA reviewed a proposal to add a new Subparagraph (c) to the original proposal to address jet aircraft refueling applications. The Measuring Sector considered the proposed marked maximum flow rate of 575 L (150 gal/min), but agreed it should be changed to 375 L (100 gal/min) to harmonize with a similar requirement in Handbook 44 Section 3.31. Paragraph S.1.1.3. Value of the Smallest Unit (c). The Measuring Sector and SWMA supported the modified proposal as shown above. SWMA agreed to forward the proposal to the NCWM S&T Committee with the recommendation that the new Subparagraph (c) be added to the original proposal.

### **330-2 S.1.6.5.5. Display of Quantity and Total Price and S.1.6.5.6. Display of Quantity and Total Price, Aviation Refueling Applications**

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Modify Handbook 44 Section 3.30. Paragraph S.1.6.5.5. and add a new Paragraph S.1.6.5.6. as follows:

***S.1.6.5.5. Display of Quantity and Total Price. – Except for aviation refueling applications, When a delivery is completed, the total price and quantity for that transaction shall be displayed on the face of the dispenser for at least 5 min or until the next transaction is initiated by using controls on the device or other customer-activated controls.***  
[Nonretroactive as of January 1, 1994]  
(Added 1992) (Amended 1996 **and 200X**)

***S.1.6.5.6. Display of Quantity and Total Price, Aviation Refueling Applications. – The quantity must be displayed throughout the transaction. The total price must also be displayed; however, it may either be displayed throughout the transaction or only at the end of the transaction. The total price display can appear on the face of the dispenser or through a controller adjacent to the device. Total price and quantity must be displayed for at least 5 minutes or until the next transaction is initiated by using controls on the device or other customer-***

**activated controls. A printed receipt including, at a minimum, the total price, quantity, and unit price must also be provided.**

**(Added 200X)**

**[Nonretroactive as of January 1, 200X]**

**Background/Discussion:** The typical self-serve installation for aviation fuels does not use an analog or digital “gasoline dispenser” that simultaneously displays money and volume. In most cases the self-serve user interface is a credit card console/controller that handles the transaction. These devices display only quantity and are not set up for the simultaneous display of quantity and total price. This proposal provides an exemption for aviation refueling based on the position that the information provided by equipment that complies with the proposal is sufficient for the customers using these devices. The submitter stated that pilots are an informed group of customers that necessarily pay attention to the quantity of fuel put onboard the aircraft during a refueling operation, but are less concerned about the total cost of the commodity until the end of the transaction. As long as a unit price is posted, they have the ability to verify that the total price is correct provided it is available at the end of the transaction.

Some designs of aviation self-serve dispensing systems use a meter-register that is a PD meter that can have a mechanical register and pulser, an electronic register with pulse output, or an “industrial” dispenser with a “volume only display” and a pulse output. The meter-register sends pulses to the credit card console/controller. In the example given, all three components including the console/controller have separate NTEP certificates, but were not evaluated as a system.

In June 2006 a jurisdiction reviewed a couple of planned installations and informed the installing company that the equipment was a “retail motor-fuel dispenser” that required continuous display of “quantity and total sale.” In addition some “card-lock systems” were opened to other self-serve customers. This started a series of exchanges of information between several parties including two console/controller manufacturers, several equipment suppliers, and the weights and measures jurisdiction.

The submitter stated that a typical “retail gasoline dispenser” that has the simultaneous display of quantity and total price capability is not designed, in terms of materials of construction, for aviation gasoline or jet fuel, nor does it have the appropriate flow rate capability. Some higher flow rate diesel dispensers have the materials of construction that are not compatible with some aircraft fuels and do not have the flow rate capability required for stationary jet refueling applications.

There is one small company that assembles dispensers that could put together a unit to meet the materials of construction and minimum flow requirements. Their NTEP certificate currently covers diesel and gasoline applications on their simultaneous display dispenser. They could use the appropriate aviation-approved materials of construction components for applications up to 50 gpm and simultaneously display quantity and total price. However, these devices are not commonly used in the aviation industry and the maximum flow rate of the meter would be inadequate for jet fuel applications.

At their fall 2006 meetings, the NTETC Measuring Sector and SWMA reviewed a proposal to allow devices used in aircraft refueling to either display or print the total price and quantity delivered at the end of the transaction. The Measuring Sector took no position on the proposal because most members did not feel qualified to make an informed recommendation concerning the proposal. SWMA believed that a printed receipt containing, at a minimum, the quantity, unit price, and total price should be required for all deliveries; therefore, SWMA modified the above proposal to allow devices used in aircraft refueling to display the total price either throughout the transaction or at the end of the transaction provided a printed receipt was available. SWMA agreed to forward the modified proposal to the NCWM S&T Committee with the recommendation that it be a voting item on the Committee’s 2007 agenda.

### **330-3 S.3.1. Diversion of Measured Liquid**

**Source:** Carryover Item 330-4. (This item originated from the Central Weights and Measures Association (CWMA) and first appeared on the Committee’s 2006 agenda.)

**Recommendation:** Amend Paragraph S.3.1. as follows:

**S.3. Discharge Lines and Valves.**

**S.3.1. Diversion of Measured Liquid.** - No means shall be provided by which any measured liquid can be diverted from the measuring chamber of the meter or its discharge line. Two or more delivery outlets may be installed only if automatic means are provided to ensure that:

- (a) liquid can flow from only one outlet at a time, and
- (b) the direction of flow for which the mechanism may be set at any time is clearly and conspicuously indicated.

~~An manually controlled~~ outlet that may be opened for purging or draining the measuring system or for recirculating, if recirculation is required in order to maintain the product in a deliverable state, suspension shall be permitted ~~only when the system is measuring food products or agri-chemicals~~. Effective automatic means shall be provided to prevent passage of liquid through any such outlet during normal operation of the measuring system and to inhibit meter indications (or advancement of indications) and recorded representations while the outlet is in operation.

(Amended 1991, 1995, ~~and~~ 1996, and 200X)

WWMA recommends an alternate proposal as follows:

**S.3.1. Diversion of Measured Liquid.** - No means shall be provided by which any measured liquid can be diverted from the measuring chamber of the meter or its discharge line. Two or more delivery outlets may be installed only if automatic means are provided to ensure that:

- (a) liquid can flow from only one outlet at a time, and
- (b) the direction of flow for which the mechanism may be set at any time is clearly and conspicuously indicated.

~~An manually controlled~~ outlet that may be opened for purging or draining the measuring system or for recirculating, if recirculation is required in order to maintain the product in a deliverable state, suspension shall be permitted ~~only when the system is measuring food products, or agri-chemicals, biodiesel or biodiesel blends~~. Effective automatic means shall be provided to prevent passage of liquid through any such outlet during normal operation of the measuring system and to inhibit meter indications (or advancement of indications) and recorded representations while the outlet is in operation.

(Amended 1991, 1995, ~~and~~ 1996 and 200X)

**Background/Discussion:** CWMA noted that the requirements in Paragraph S.3.1. in Section 3.30. of the Liquid-Measuring Devices Code and Paragraph S.4.1. Diversion of Measured Product in Section 3.37. of the Mass Flow Meters Code of NIST Handbook 44 are not consistent with each other. Paragraph S.3.1. bans manual valves for recirculating product or for purging or draining the measuring system, except for foods and agri-chemicals. Paragraph S.3.1. allows manual valves but appears to ban automatic valves by omission and it makes no distinction for types of products measured as long as the system meets the specified requirements.

Cold weather and physical characteristics make recirculation necessary for a number of products not currently recognized in Paragraph S.3.1., for example, #6 fuel oil and B100 biodiesel. Liquid-measuring devices exist which have NTEP CCs for these high viscosity products; however, the current wording of Handbook 44 forces vendors of these products to use mass flow meters if they wish to recirculate their product in order to keep it in a deliverable state. This appears to be the unintended result of the fact that the two codes were written at different times with input from different segments of industry. CWMA does not believe retailers of these products should be restricted to using only mass flow meters for commercial measurements if other suitable technologies are available. Likewise, CWMA believes that both manual and automatic valves are suitable for recirculating products in discharge lines of liquid-measuring devices, and the requirements for either type of meter should be the same.

The Committee believes that the means to prevent passage of liquid through any such outlet during normal operation of the measuring system and to inhibit meter indications should be automatic. Therefore, the Committee modified the proposal accordingly.

At the 2006 NCWM Annual Meeting, this proposal along with a corresponding proposal to modify the Mass Flow Meters Code was presented for a vote. The Committee received input regarding the inappropriateness of allowing diversion of product on all types of liquid-measuring device applications. The vote on this item did not yield a sufficient number of positive or negative votes for the item to be accepted or defeated and, therefore, it was returned to the Committee for further action. The corresponding proposal under 2005 S&T Agenda Item 337-2, S.4.1. Diversion of Measured Product to similarly modify the Mass Flow Meters Code, was adopted.

At its fall 2006 meeting, CWMA affirmed that this proposal was drafted primarily to address an inequity between mass flow meters and other liquid-measuring devices in handling biodiesel and #6 fuel oil at terminals and marine fuelers. The objections to the proposal at the 2006 NCWM Annual Meeting seemed to center on the idea that passage of this proposal would lead to widespread recirculation at retail motor-fuel pumps and in applications with products other than biodiesel and #6 fuel oil. Minnesota, which adopted this proposal by rule in 2005, has experienced neither of these phenomena.

It has been Minnesota's experience that, because recirculation systems are expensive to install and operate, industry has utilized it only as a last resort. Recirculation has been confined to the marine fuelers on Lake Superior, to a handful of terminals in the coldest regions of the state, and to milk meters where recirculation has always been allowed. Minnesota has received no complaints about these installations and has seen no evidence that allowing recirculation has led to the facilitation of fraud.

Because recirculation is allowed in Paragraph S.4.1. of the Mass Flow Meters Code for any product requiring it to be kept in deliverable form, failure to pass this proposal will not prevent recirculation of products other than milk or agricultural chemicals dispensed from mass flow meters. It will just force device owners to purchase mass flow technology for that purpose instead. This seems like an undue burden on the device owner who might already own meters which are otherwise suitable for the intended product. It also seems to be an unfair competitive advantage for mass flow technology over other meter technologies. That advantage was created by the lack of harmonization between the Liquid-Measuring Devices Code and the Mass Flow Meters Code in Handbook 44, and the inequity can be ended by passage of this proposal.

WWMA discussed an objection to the proposal because it would allow diversion and recirculation of all products. It may not be appropriate to recirculate some products and might facilitate fraudulent practices. WWMA recognizes that jurisdictions are preparing for sales of alternate fuels, but is uncertain at what point biodiesel products and blends need recirculating (low temperature limits or specific blend ratios). The WWMA S&T Committee agreed the list of products should be limited, but should recognize all biodiesel products and blends. Consequently, WWMA developed an alternate proposal as shown in the recommendation above and recommended it move forward as a voting item on the 2007 CWMA S&T Committee's agenda.

SWMA agreed with WWMA's position.

NEWMA supports the original proposal as written in the recommendation above.

## **331 VEHICLE-TANK METERS**

### **331-1 Temperature Compensation**

**Source:** Carryover Item 331-3. (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 2000 agenda.)

**Discussion/Background:** The Committee is considering a proposal to modify Section 3.31. Vehicle-Tank Meters (VTM) Code by adding the following new paragraphs to recognize temperature compensation as follows:

**S.2.5. Automatic Temperature Compensation for Refined Petroleum Products.**

**S.2.5.1. Automatic Temperature Compensation for Refined Petroleum Products. - A device may be equipped with an automatic means for adjusting the indication and registration of the measured volume of product to the volume at 15 °C (60 °F) where not prohibited by state law.**

**S.2.5.2. Provision for Deactivating. - On a device equipped with an automatic temperature-compensating mechanism that will indicate or record only in terms of liters (gallons) compensated to 15 °C (60 °F), provision shall be made for deactivating the automatic temperature-compensating mechanism so the meter can indicate and record, if it is equipped to record, in terms of the uncompensated volume.**

**S.2.5.3. Gross and Net Indications. - A device equipped with automatic temperature compensation shall indicate and record, if equipped to record, both the gross (uncompensated) and net (compensated) volume for testing purposes. If both values cannot be displayed or recorded for the same test draft, means shall be provided to select either the gross or net indication for each test draft.**

**S.2.5.4. Provision for Sealing Automatic Temperature-Compensating Systems. - Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that an automatic temperature-compensating system cannot be disconnected and no adjustment may be made to the system.**

**S.2.5.5. Temperature Determination with Automatic Temperature Compensation. - For test purposes, means shall be provided (e.g., thermometer well) to determine the temperature of the liquid either:**

**(a) in the liquid chamber of the meter, or**

**(b) immediately adjacent to the meter in the meter inlet or discharge line.**

**(Added 200X)**

**S.5.6. Temperature Compensation for Refined Petroleum Products. - If a device is equipped with an automatic temperature compensator, the primary indicating elements, recording elements, and recording representation shall be clearly and conspicuously marked to show the volume delivered has been adjusted to the volume at 15 °C (60 °F).**

**(Added 200X)**

**N.4.1.3. Automatic Temperature-Compensating Systems for Refined Petroleum Products. - On devices equipped with automatic temperature-compensating systems, normal tests shall be conducted:**

**(a) by comparing the compensated volume indicated or recorded to the actual delivered volume corrected to 15 °C (60 °F); and**

**(b) with the temperature-compensating system deactivated, comparing the uncompensated volume indicated or recorded to the actual delivered volume.**

**The first test shall be performed with the automatic temperature-compensating system operating in the "as-found" condition. On devices that indicate or record both the compensated and uncompensated volume for each delivery, the tests in (a) and (b) may be performed as a single test.**

**(Added 200X)**

**N.5. Temperature Correction for Refined Petroleum Products. - Corrections shall be made for any changes in volume resulting from the differences in liquid temperatures between the time of passage through the meter and the time of volumetric determination in the prover. When adjustments are necessary, appropriate petroleum measurement tables should be used.**

**(Added 200X)**

**T.2.1. Automatic Temperature-Compensating Systems. - The difference between the meter error (expressed as a percentage) for results determined with and without the automatic temperature-compensating system activated shall not exceed:**

**(a) 0.4 % for mechanical automatic temperature-compensating systems; and**

**(b) 0.2 % for electronic automatic temperature-compensating systems.**

**The delivered quantities for each test shall be approximately the same size. The results of each test shall be within the applicable acceptance or maintenance tolerance.**

**(Added 200X)**

**UR.2.5. Temperature Compensation for Refined Petroleum Products.**

**UR.2.5.1. Automatic.**

**UR.2.5.1.1. When to be Used. - In a state that does not prohibit, by law or regulation, the sale of temperature-compensated product, a device equipped with an operable automatic temperature compensator shall be connected, operable, and in use at all times. An electronic or mechanical automatic temperature-compensating system may not be removed, nor may a compensated device be replaced with an uncompensated device, without the written approval of the responsible weights and measures jurisdiction.**

**[Note: This requirement does not specify the method of sale for products measured through a meter.]**

**UR.2.5.1.2. Invoices. - An invoice based on a reading of a device that is equipped with an automatic temperature compensator shall show that the volume delivered has been adjusted to the volume at 15 °C (60 °F).**

**(Added 200X)**

This proposal was developed to provide design requirements and testing criteria for vehicle-tank metering systems that incorporate temperature compensation capability. When this item was originally submitted, several officials reportedly were confused about the specific applications of a meter covered by an NTEP CC that included a temperature-compensation feature. WWMA acknowledged some jurisdictions permit temperature-compensated deliveries in applications not addressed by NIST Handbook 44. Some states do not allow the use of automatic temperature compensation for the delivery of products using a VTm. At the 2002, 2003, and 2004 NCWM Annual Meetings, this proposal did not achieve a majority vote to pass or fail and was, therefore, returned to the Committee for further consideration.

The L&R Committee has kept a corresponding item addressing the method of sale for petroleum products on its agenda. The L&R Committee proposal allows voluntary temperature compensation for the sale of petroleum products, other than LPG through a meter with a flow greater than 20 gal/min and petroleum products sold through retail motor-fuel devices.

During the 2005 NCWM Annual Meeting, a manufacturer stated that the number of requests for retail motor-fuel dispensers with temperature compensation capability is increasing. The Committee has heard differing positions on this issue from the regional associations indicating that: (1) temperature compensation is also a “method of sale” issue and the proposal should be retained as an information item until an accompanying method of sale requirement is added to NIST Handbook 130; (2) the proposal has strong support, and the item should go forward for adoption; and (3) there is not enough support for this item; therefore, it would not be adopted.

At the 2006 NCWM Interim Meeting, the Committee agreed to leave the proposal on its agenda as an information item because the L&R Committee was closer to fully developing a corresponding method of sale requirement that is acceptable to most jurisdictions. The Committee encourages the weights and measures community to review the newly modified L&R item along with the proposal shown in the recommendation above and provide input to the Committee prior to the 2007 January NCWM Interim Meeting.

At their fall meetings CWMA, NEWMA, SWMA, and WWMA supported the proposal as a voting item on the 2007 NCWM S&T Committee's agenda. SWMA recommended the development of an additional requirement that the device have the ability to display both gross and net indications, but did not have a specific proposal to offer at the time. WWMA reiterated that temperature-compensated devices are already in use in some jurisdictions.

For additional background on this item, see the 2000 through 2006 S&T Final Reports.

### 356(a) GRAIN MOISTURE METERS

#### 356-1 S.1.2. Grain or Seed Kind and Class Selection and Recording and Table S.1.2. Grain Types Considered for Type Evaluation and Calibration and Minimum Acceptable Abbreviations

**Source:** NTETC Grain Analyzer (GA) Sector

**Recommendation:** Modify Handbook 44 Section 5.56.(a) Grain Moisture Meters Paragraph S.1.2. and Table S.1.2. to include minimum acceptable abbreviations for "multi-class" grain moisture calibrations as follows:

**S.1.2. Grain or Seed Kind and Class Selection and Recording.** - Provision shall be made for selecting and recording the kind and class or multi-class group (as appropriate) of grain or seed to be measured. The means to select the kind and class or multi-class group of grain or seed shall be readily visible and the kind and class or multi-class group of grain or seed selected shall be clearly and definitely identified. Abbreviations for grain types and multi-class groups indicated on the meter must meet the minimum acceptable abbreviations listed in Table S.1.2. ~~Meters shall have the capability (i.e., display capacity) of indicating the grain type using a minimum of four characters in order to accommodate the four-character abbreviations listed in Table S.1.2.~~ (Amended 1993, ~~and~~ 1995, and 200X)

<i><b>Table S.1.2. Grain Types and Multi-Class Groups Considered for Type Evaluation and Calibration and Their Minimum Acceptable Abbreviations</b></i>			
<i><b>Grain Type</b></i>	<i><b>Minimum Acceptable Abbreviation</b></i>	<i><b>Grain Type</b></i>	<i><b>Minimum Acceptable Abbreviation</b></i>
<i>Corn</i>	<i>CORN</i>	<i>Soybeans</i>	<i>SOYB</i>
<i>Durum Wheat</i>	<i>DURW</i>	<i>Two-Rowed Barley</i>	<i>TRB</i>
<i>Soft White Wheat</i>	<i>SWW</i>	<i>Six-Rowed Barley</i>	<i>SRB</i>
<i>Hard Red Spring Wheat</i>	<i>HRSW</i>	<i>All-Class Barley*</i>	<i><u>BARLEY</u></i>
<i>Hard Red Winter Wheat</i>	<i>HRWW</i>	<i>Oats</i>	<i>OATS</i>
<i>Soft Red Winter Wheat</i>	<i>SRWW</i>		
<i>Hard White Wheat</i>	<i>HDWW</i>		
<i>All-Class Wheat*</i>	<i><u>WHEAT</u></i>		
<i>Wheat Excluding Durum*</i>	<i><u>WHTXDUR</u></i>		
<i>Sunflower seed (Oil)</i>	<i>SUNF</i>	<i>Long Grain Rough Rice</i>	<i>LGRR</i>
		<i>Medium Grain Rough Rice</i>	<i>MGRR</i>
		<i>All-Class Rough Rice*</i>	<i><u>RGHRICE</u></i>
<i>Grain Sorghum</i>	<i>SORG <u>or</u></i>	<i>Small Oil Seeds (under consideration)</i>	
	<i>MILO</i>		

**[Note: Grain Types marked with an asterisk (\*) are "Multi-Class Calibrations"]**

*[Nonretroactive as of January 1, 1998]*

(Table Added 1993) (Amended 1995, ~~and~~ 1998, and 200X)

**Background/Discussion:** The GMM Chapter of Publication 14 was recently amended to allow multi-class moisture calibrations. "Multi-class" describes the grouping of grain classes in a calibration. There are a total of 15 NTEP grains, which include wheat, rice and barley, all of which have different classes. There are six classes of wheat, two classes of barley and two classes of rice. A manufacturer may decide to have (1) a separate calibration for each individual class of wheat, rice or barley, or (2) have a single calibration for all the classes of wheat, barley or rice ("All-Class Wheat, All-



Class Barley, or All-Class Rice”), or (3) have a calibration that includes all the classes of wheat except durum wheat (“WHEXNDUR” Wheat excluding durum). Examples (2) and (3) are “multi-class” calibrations. Currently, the acceptable abbreviations (and grain names) in Table S.1.2. of Handbook 44 do not address the groupings and the names that might be used for selecting and recording “multi-class” calibrations. At its August 2006 meeting, the NTETC Grain Analyzer Sector agreed that “multi-class” groups should be added to Table S.1.2. Grain Types Considered for Type Evaluation and Calibration and Minimum Acceptable Abbreviations and included minimum acceptable abbreviations for “multi-class” groups, and Paragraph S.1.2. Grain or Seed Kind and Class Selection and Recording should be modified to recognize “multi-class” groupings.

Paragraph S.1.2. Grain or Seed Kind and Class Selection and Recording requires that the means to select the kind and class of grain or seed be readily visible and that the kind and class of grain or seed selected be clearly and definitely identified. A multi-class grain calibration that includes all the NTEP classes of a given grain type (e.g., two-rowed barley and six-rowed barley) can be clearly and definitely identified by a single type name (e.g., BARLEY). Similarly, both long-grain and medium-grain rough rice could be identified unambiguously as “rough rice.” However, a multi-class grain calibration that does not include all of the NTEP classes of a grain type may not be clearly and definitely identified using a single grain type name (e.g., wheat). For example, a calibration for “all wheat except durum” cannot be labeled “WHEAT” because the grain type “WHEAT” (i.e. “all-class wheat”) includes “durum wheat.”

At its August 2006 meeting the NTETC Grain Analyzer Sector agreed the originally suggested multi-class groups—soft wheat, hard wheat, red wheat, and white wheat—were confusing and subject to potential misuse. Only the following multi-class groups should be considered for type evaluation:

All-Class Wheat  
Wheat Excluding Durum  
All-Class Barley  
All-Class Rough Rice

A poll of manufacturers present revealed that increasing the four-character display requirement of Paragraph S.1.2. to eight characters would not be a problem with instruments in current production; therefore, it was agreed that up to eight characters could be used for multi-class group abbreviations. The Sector agreed that the sentence specifying the display capacity was not needed because the necessary display capacity was obvious from the number of characters in the longest minimum acceptable abbreviation listed in Table S.1.2.

The Sector agreed to modify Paragraph S.1.2. and Table S.1.2. as shown above and forward its recommendation to the 2007 NCWM S&T Committee for consideration.

SWMA recommended the proposal move forward to the NCWM S&T Committee as a voting item on its 2007 agenda.

Note: The WMD technical advisors agree that adding definitions for “multi-class” and “all-class” groups would assist weights and measures officials in understanding the differences between the two. Prior to the 2007 Interim Meeting WMD will ballot the Sector for approval of a proposed definition for each.

## **357 NEAR-INFRARED GRAIN ANALYZERS**

### **357-1 S.1.2. Selecting Grain Class and Constituent and Table S.1.2. Grain Types Considered for Type Evaluation and Calibration and Minimum Acceptable Abbreviations**

**Source:** NTETC Grain Analyzer (GA) Sector

**Recommendation:** Modify NIST Handbook 44 Section 5.57. Near-Infrared (NIR) Grain Analyzers Paragraph S.1.2. Selecting Grain Class and Constituent and Table S.1.2. Grain Types Considered for Type Evaluation and Calibration and Minimum Acceptable Abbreviations to include minimum acceptable abbreviations for “multi-class” constituent (protein, starch, and oil) calibrations as shown below.

*S.1.2. Selecting and Recording Grain Class and Constituent. - Provision shall be made for selecting, and recording the type or class or multi-class group of grain and the constituent(s) to be measured. The means to select the grain*

type or class **or multi-class group** and **the** constituent(s) shall be readily visible and the type or class **or multi-class group** of grain and the constituent(s) selected shall be clearly and definitely identified in letters (such as HRWW, HRSW, **WHEAT**, etc. or PROT, etc.). A symbol to identify the display of the type or class **or multi-class group** of grain and constituent(s) selected is permitted provided that it is clearly defined adjacent to the display. Minimum acceptable abbreviations are listed in Table S.1.2. ~~Meters shall have the capability (i.e., display capacity) of indicating the grain type using a minimum of four characters in order to accommodate the abbreviations listed in Table S.1.2.~~

[Nonretroactive as of January 1, 2003]

If more than one calibration is included for a given grain type, the calibrations must be clearly distinguished from one another.

[Nonretroactive as of January 1, 2004]

<b>Table S.1.2. Grain Types and Multi-Class Groups Considered for Type Evaluation and Calibration and Their Minimum Acceptable Abbreviations</b>	
<b>Grain Type</b>	<b>Minimum Acceptable Abbreviation</b>
Durum Wheat	DURW
Hard Red Spring Wheat	HRSW
Hard Red Winter Wheat	HRWW
Hard White Wheat	HDWW
Soft Red Winter Wheat	SRWW
Soft White Wheat	SWW
<b><u>All-Class Wheat*</u></b>	<b><u>WHEAT</u></b>
<b><u>Wheat Excluding Durum*</u></b>	<b><u>WHTEXDUR</u></b>
Soybeans	SOYB
Two-Rowed Barley	TRB
Six-Rowed Barley	SRB
<b><u>All-Class Barley*</u></b>	<b><u>BARLEY</u></b>
Corn	CORN

**[Note: Grain Types marked with an asterisk (\*) are “Multi-Class Calibrations”]**

[Nonretroactive as of January 1, 2003]

(Table Amended 2001 **and 200X**)

(Amended 2003 **and 200X**)

**Background/Discussion:** The NIR Chapter of Publication 14 was recently amended to allow multi-class moisture calibrations. “Multi-class” describes the grouping of grain classes in a calibration. There are a total of 15 NTEP grains, which include wheat, rice and barley, all of which have different classes. There are six classes of wheat, two classes of barley and two classes of rice. A manufacturer may decide to have (1) a separate calibration for each individual class of wheat, rice or barley, or (2) have a single calibration for all the classes of wheat, barley or rice (“All-Class Wheat, All-Class Barley, or All-Class Rice”), or (3) have a calibration that includes all the classes of wheat except durum wheat (“WHTEXDUR” Wheat excluding durum). Examples (2) and (3) are “multi-class” calibrations. Currently, the acceptable abbreviations (and grain names) in Table S.1.2. of Handbook 44 do not address the groupings and the names that might be used for selecting and recording “multi-class” calibrations. At its August 2006 meeting, the NTETC Grain Analyzer Sector agreed that “multi-class” groups should be added to Table S.1.2. Grain Types Considered for Type Evaluation and Calibration and Minimum Acceptable Abbreviations and included minimum acceptable abbreviations for “multi-class” groups, and Paragraph S.1.2. Selecting Grain Class and Constituent should be modified to recognize “multi-class” groupings.

The Sector recommended changes to the GMM Code Table S.1.2. and Paragraph S.1.2. and also recommended modifications to the Near-Infrared Code to provide minimum acceptable abbreviations for multi-class groupings when user selection of a multi-class group is performed using the group name or an abbreviation of the name.

The Sector agreed to modify Paragraph S.1.2. and Table S.1.2. as shown above and forward its recommendation to the 2007 NCWM S&T Committee for consideration.

**SWMA Recommendation:** SWMA recommended the proposal move forward to the NCWM S&T Committee as a voting item on its 2007 agenda.

Note: The WMD technical advisors believe that adding definitions for “multi-class” and “all-class” groupings would assist weights and measures officials in understanding the differences between the two. Prior to the 2007 Interim Meeting WMD will ballot the Sector for approval of a proposed definition for each.

### 360 OTHER ITEMS

#### 360-1 International Organization of Legal Metrology (OIML) Report

Many issues before the OIML, the Asian-Pacific Legal Metrology Forum (APLMF), and other international groups are within the purview of the Committee. Additional information on OIML activities will appear in the 2007 Board of Directors Interim agenda and on the OIML website at <http://www.oiml.org>. NIST WMD staff will provide updates on OIML activities during the open hearing session at the January 2007 NCWM Interim Meeting in Jacksonville, Florida. For more information on specific OIML-related device activities, contact the WMD staff listed in the table below. The OIML projects listed below represent only currently active projects. For additional information on other OIML device activities that involve WMD staff, please contact WMD using the information listed below:

WWMA and SWMA support these issues and the related device activities as an Information Item on the Committee's agenda.

NIST Weights and Measures Division (WMD) Contact List				
Staff	Telephone	E-mail	Responsibilities	Postal Mail or Fax
Mr. Steven Cook (LMDG)	(301) 975-4003	steven.cook@nist.gov	<ul style="list-style-type: none"> <li>•R 50 "Continuous totalizing Automatic Weighing Instruments (Belt Weighers)"</li> <li>•R 51 "Automatic Catchweighing Instruments"</li> <li>•R 60 "Metrological Regulations for Load Cells"</li> <li>•R 76 "Non-automatic Weighing Instruments"</li> </ul>	All contacts:  NIST WMD 100 Bureau Drive MS 2600 Gaithersburg, MD 20899-2600
Dr. Charles Ehrlich (ILMG)	(301) 975-4834	charles.ehrlich@nist.gov	<ul style="list-style-type: none"> <li>•B 10 "Framework for a Mutual Acceptance Arrangement (MAA) on OIML Type Evaluations"</li> <li>•TC 3/SC 5 "Expression of Uncertainty in Measurement in Legal Metrology Applications,"</li> <li>"Guidelines for the Application of ISO/IEC 17025 to the Assessment of Laboratories Performing Type Evaluation Tests," &amp; "OIML Procedures for Review of Laboratories to Enable Mutual Acceptance of Test Results and OIML Certificates of Conformity"</li> </ul>	WMD Tel: (301) 975-4004  Fax: (301) 975-8091

<b>NIST Weights and Measures Division (WMD) Contact List</b>				
<b>Staff</b>	<b>Telephone</b>	<b>E-mail</b>	<b>Responsibilities</b>	<b>Postal Mail or Fax</b>
Mr. Richard Harshman (LMDG)	(301) 975-8107	richard.harshman@nist.gov	<ul style="list-style-type: none"> <li>•R 106 “Automatic Rail-weighbridges”</li> <li>•R 107 “Discontinuous Totalizing Automatic Weighing Instruments” (totalizing hopper weighers)</li> <li>•R 134 “Automatic Instruments for Weighing Road Vehicles In-Motion and Measuring Axle Loads”</li> </ul>	
Ms. Diane Lee McGowan (LMDG)	(301) 975-4405	diane.lee@nist.gov	<ul style="list-style-type: none"> <li>•R 59 “Moisture Meters for Cereal Grains and Oilseeds”</li> <li>•R 92 “Wood Moisture Meters-Verification Methods and Equipment”</li> <li>•R 121 “The Scale of Relative Humidity of Air Certified Against Saturated Salt Solution”</li> <li>•TC 17/SC 8 “Measuring Instruments for Protein Determination in Grains”</li> </ul>	
Mr. Ralph Richter (ILMG)	(301) 975-3997	ralph.richter@nist.gov	<ul style="list-style-type: none"> <li>•R 35 “Material Measures of Length for General Use”</li> <li>•R 105 &amp; R 117 “Measuring Systems for Liquids Other Than Water” (includes Direct Mass)</li> <li>•R 118 “Testing Procedures and Test Report Format for Pattern Examination of Fuel Dispensers for Motor Vehicles”</li> <li>•TC 3/SC 4 “Verification Period of Utility Meters Using Sampling Inspections”</li> </ul>	
Mr. Wayne Stiefel (ILMG)	(301) 975-4011	s.stiefel@nist.gov	<ul style="list-style-type: none"> <li>•TC 8/SC 8 “Gas Meters” (Diaphragm, Rotary Piston, &amp; Turbine Gas Meters)</li> <li>•R 49 “Water Meters” (Cold Potable Water &amp; Hot Water Meters)</li> <li>•R 71 “Fixed Storage Tanks”</li> <li>•R 80 “Road and Rail Tankers”</li> <li>•R 85 “Automatic Level Gauges for Measuring the Level of Liquid in Fixed Storage Tanks”</li> <li>•TC 5/SC 2 “General Requirements for Software Controlled Measuring Instruments”</li> <li>•TC 8/SC 7 P1 “Measuring Systems for Gaseous Fuel” (i.e., large pipelines)</li> <li>•TC 8/SC 7 P2 “Compressed Gaseous Fuels Measuring Systems for Vehicles”</li> </ul>	

<b>NIST Weights and Measures Division (WMD) Contact List</b>				
<b>Staff</b>	<b>Telephone</b>	<b>E-mail</b>	<b>Responsibilities</b>	<b>Postal Mail or Fax</b>
Dr. Ambler Thompson (ILMG)	(301) 975-2333	ambler@nist.gov	<ul style="list-style-type: none"> <li>•D 16 “Principles of Assurance of Metrological Control”</li> <li>•D 19 “Pattern Evaluation and Pattern Approval”</li> <li>•D 20 “Initial and Subsequent Verification of Measuring Instruments and Processes”</li> <li>•D 27 Initial Verification of Measuring Instruments Using the Manufacturer’s Quality Management System”</li> <li>•R 34 “Accuracy Classes of Measuring Instruments”</li> <li>•R 46 “Active Electrical Energy Meters for Direct Connection of Class 2”</li> </ul>	
Ms. Juana Williams (LMDG)	(301) 975-3989	juana.williams@nist.gov	•R 21 “Taximeters”	
<b>LIST OF ACRONYMS</b>				
ILMG – International Legal Metrology Group	LMDG– Legal Metrology Devices Group	B – Basic Publication D – Document P – Project	R – Recommendation SC – Subcommittee TC – Technical Committee	

### 360-2 Developing Items

NCWM established a category of items called “Developing Items” as a mechanism to share information about emerging issues which have merit and are of national interest, but that have not received sufficient review by all parties affected by the proposal or that may be insufficiently developed to warrant review by the Committee. The developing items are currently under review by at least one regional association or technical committee.

Developing Items are listed in Appendix A according to the specific NIST Handbook 44 Code section under which they fall. Periodically, proposals will be removed from the developing item agenda without further action because the submitter recommends that it be withdrawn. Any remaining proposals will be renumbered accordingly.

The Committee encourages interested parties to examine the proposals included in Appendix A and send their comments to the contact listed in each item. The Committee asks that the regional associations and NTETC Sectors continue their work to fully develop each proposal. Should an association or Sector decide to discontinue work on an item, the Committee asks that it be notified.

---

Michael J. Sikula, New York, Chairman (1)

Carol P. Fulmer, South Carolina (2)

Todd R. Lucas, Ohio (3)

Brett Saum, San Luis Obispo County, California (4)

Kristin J. Young, Colorado (5)

Ted Kingsbury, Measurement Canada, Technical Advisor

Richard Suiter, NIST, Technical Advisor

Juana Williams, NIST, Technical Advisor

### Specifications and Tolerances Committee

THIS PAGE INTENTIONALLY LEFT BLANK

## Appendix A

### Item 360-2: Developing Items

#### Part 1, Item 1 Belt-Conveyor Scale Systems: UR.3.2.(c) Maintenance; Zero Load Tests

**Source:** Western Weights and Measures Association (WWMA)

**Recommendation:** Modify UR.3.2.(c) as follows:

**UR.3.2. Maintenance.** - Belt-conveyor scales and idlers shall be maintained and serviced in accordance with manufacturer's instructions and the following:

- (c) **Zero-load and load (simulated or material) tests.** ~~Simulated load tests, or material tests, and zero load tests~~ shall be conducted at periodic intervals between official tests in order to provide reasonable assurance that the device is performing correctly.  
**(Amended 200X)**

**The action to be taken as a result of the zero-load tests is as follows:**  
**(Added 2000X)**

- **if the change in zero is less than  $\pm 0.1$  %, make no adjustment, record results and proceed to simulated load tests; or**
- **if the change in zero is  $\pm 0.1$  % to  $\pm 0.25$  %, inspect the conveyor and weighing area for compliance with UR.2. Installation Requirements and retest.**  
**(Added 200X)**

The action to be taken as a result of the simulated load or material tests ~~or simulated load tests~~ is as follows:  
**(Amended 2002)**

- if the error is less than 0.25 %, no adjustment is to be made;
- if the error is at least 0.25 % but not more than 0.6 %, **inspect the conveyor and weighing area for compliance with UR.2. Installation Requirements and repeat the test** ~~adjustment may be made if the official with statutory authority is notified;~~  
(Amended 1991 **and 200X**)
- **if the result of tests, after compliance with UR.2. Installation Requirements is verified, remain greater than  $\pm 0.25$  %, a span correction shall be made and the official with statutory authority notified**
- if the error is greater than 0.6 % but does not exceed 0.75 %, **inspect the conveyor and weighing area for compliance with UR.2. Installation Requirements, and repeat the test;**  
(Amended 1991 **and 200X**)
- **if the result of tests, after UR.2. Installation Requirements compliance is verified, remain greater than  $\pm 0.25$  %, a span correction shall be made, the official with statutory authority shall be notified and an official test shall be conducted**
- if the error is greater than 0.75 %, an official test is required.  
(Amended 1987 and 200X)

**Discussion:** NIST Handbook 44 gives limited guidance on what to do with zero-load test results. Belt loss is not the only factor which may require the scale operator to make physical adjustments to the belt-conveyor system to correct for deficiencies. For example, a dirty scale structure or a worn belt scraper will increase the zero reference number and the test results may exceed tolerances.

The scale user/owner has to protect his interest between weighing transactions. At present, some belt-conveyor systems may have error greater than 0.5 % in zero reference over a 24-hour period. The belt is part of tare (net load) on any empty running system and the system must be maintained to within tolerance at all times.

During its 2006 meeting, WWMA recommended the alternate industry proposal shown above. WWMA also recommended the alternate proposal be considered at a future meeting of the USNWG on Belt-Conveyor Scale Systems. WWMA recommended the alternate proposal remain a developmental item to allow sufficient time for a review by the work group. CWMA concurs with WWMA's recommendation.

SWMA agrees with the WWMA recommendation

To comment on this proposal, contact Steven Cook, NIST Technical Advisor to the NTETC Belt-Conveyor Scales Sector, by e-mail at [steven.cook@nist.gov](mailto:steven.cook@nist.gov), by telephone at (301) 975-4003, by fax at (301) 975-8091, or by postal mail at NIST WMD, 100 Bureau Drive MS 2600, Gaithersburg, MD 20899-2600.

#### **Part 1, Item 2 Belt-Conveyor Scale Systems: UR.2.2.(n) Belt Alignment**

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Modify Paragraph UR.2.2.(n) as follows:

##### **UR.2.2. Conveyor Installation**

**(n) Belt Alignment.** – The belt shall be centered on the idlers in the weighing area and shall track in practically the same position whether empty or loaded. The belt shall not extend beyond the edge of the idler roller in any area of the conveyor.

(Amended 1998 and 200X)

**Discussion:** During the 2006 NCWM Interim Meeting, the Committee considered the NCWM review panel's recommendations and heard comments from industry. The review panel indicated the proposal should have included national data that demonstrated a need for modifying Paragraph UR.2.2. and should be a developing item. At that time, one representative from the belt-conveyor scale service industry indicated there are too many factors that influence belt tracking to ensure a belt is centered at all times. The service representative recommended that the belt should not extend beyond the edge of the idler roller in any area of the conveyor on the carrying side or touch holding brackets on the return side to reduce any detrimental affects on accuracy. Industry representatives indicated the design of idlers and scales are such that the belt is not intended to stay in exact center. Industry also indicated there is no mechanism available to monitor the belt's tracking 24 hours a day, seven days a week. Industry requested either specifications for what constitutes "center" or an acceptable "range of center" for belt tracking. Although the 2005 SWMA reported the proposal was ready for national consideration, the Committee agreed it is more appropriate to make the proposal a developing item until there is some clear indication that belt alignment can be tracked for maintenance and accuracy purposes.

At its 2006 meeting, WWMA agreed with concerns about the difficulties in tracking belt alignment and agreed it should first be determined if there are mechanisms capable of monitoring this feature before establishing device requirements. Consequently, WWMA recommended this item be withdrawn from the agenda.

CWMA does not believe this proposal should move forward without more information from industry.

In 2006, SWMA recommended the proposal remain a developing item; however, if industry provides no additional input, the item should be withdrawn from the Committee's agenda.



To comment on this proposal, contact Steven Cook, NIST Technical Advisor to the NTETC Weighing Sector, by e-mail at [steven.cook@nist.gov](mailto:steven.cook@nist.gov), by telephone at (301) 975-4003, by fax at (301) 975-8091, or by postal mail at NIST WMD, 100 Bureau Drive MS 2600, Gaithersburg, MD 20899-2600.

**Part 2, Item 1, General Code: T.5. Predominance – Retail Motor-Fuel Devices**

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** CWMA recommends withdrawing its earlier proposal to add a new Paragraph G-UR.4.1.1. to the General Code and replacing it with the following new proposal developed by the Nebraska Weights and Measures Division to add a new Paragraph T.5. to Handbook 44 Section 3.30. as follows:

**T.5. Predominance - Retail Motor-Fuel Devices. - The retail motor-fuel devices in service at a single place of business shall be considered maintained in proper operating condition when evaluation of normal test results indicate the following parameters are met:**

- (a) **The number of meters with minus test errors in excess of one-half maintenance tolerance shall be less than 60 % of the meters at the location, and**
- (b) **When there are three or more meters of a single grade or type of fuel, the average error of the meters shall not be a minus value exceeding one-half maintenance tolerance. Meter test results that exceed maintenance tolerance shall not be included in determining the average meter error of a single grade or type of fuel.**

**(Added 200X)**

In 1991, this same topic was brought before NCWM as an information item. The intent of the proposal at that time was to provide guidance to states in the interpretation of General Code Paragraph G-UR.4.1. Maintenance of Equipment. In 1993, the State of Wisconsin adopted a policy that defined “predominance” as shown in the proposal. That policy was similar to the one proposed in 1991, except Wisconsin felt that one-third acceptance tolerance was too stringent because there was a need to take into account normal variability in testing procedures, equipment, and environmental conditions found in the field. Wisconsin, therefore, adopted a “greater than one-third” maintenance tolerance guideline. In 2003, the Wisconsin policy was further refined by deleting the language “all devices are found to be in error in a direction favorable to the device user.” The new guideline for permissible errors was “sixty percent or more of the devices are found to be in error in favor of the device owner/user by more than one-third of the maintenance tolerance.” Both of these criteria were seldom used in the field because they made the policy confusing.

Recently NIST conducted a national survey of retail motor-fuel dispenser testing and the results pointed to a need to gain more uniformity in the application of tolerances. There is a wide variation in how different states handle the “predominance” question. Strides should be continually made to gain uniformity. Adoption of the proposed new Paragraph G-UR.4.1.1. would be one step toward gaining greater uniformity. With more than five years of history using the proposed criteria, Wisconsin saw a relatively low number of devices rejected on the basis of “predominance,” and most station owners and all service companies have a working understanding of predominance.

In 2005, CWMA agreed to submit the modified proposal to the NCWM S&T Committee with a recommendation that it be placed on the Committee’s agenda as a “Developing Item.”

At their fall 2006 meetings, NEWMA, SWMA, and WWMA considered an earlier CWMA proposal to modify a General Code requirement and set limits on how to determine predominance in favor of the device operator. NEWMA believes this item is already adequately addressed in Handbook 44 and recommends it be withdrawn from the NCWM S&T Committee’s 2007 agenda. SWMA recommends that Developing Item, Part 1, Item 1, on the 2006 NCWM S&T Committee agenda remain “developing” as a user requirement in the General Code. SWMA encourages the jurisdictions to review the proposed policy and try it out. WWMA considered the limits in the proposal too stringent given the effects of temperature and other uncertainties. WWMA is concerned dispensers will be set to the limits in the proposal rather than as close as practical to zero error. The current General Code adequately addresses predominance, and jurisdictions

may establish policy to gain uniformity in determining predominance. Consequently, WWMA recommends this proposal be withdrawn from the agenda.

**Part 2, Item 2 Liquid-Measuring Devices: Price Posting and Computing Capability and Requirements for a Retail Motor-Fuel Dispenser (RMFD)**

**Source:** WMD and all Regional Associations

**Recommendation:** Review and update NIST Handbook 44 requirements that address RMFD pricing and computing capability. This issue is under development and not ready for committee action.

**Background/Discussion:** In the early 1990s, various sections of the Liquid-Measuring Devices Code in NIST Handbook 44 (including Paragraphs S.1.6.4. Display of Unit Price and Product Identity, S.1.6.5.4. Selection of Unit Price, UR.3.2. Unit Price and Product Identity, and UR.3.3. Computing Device) were modified to address multi-tier pricing applications such as cash-credit. Since that time, marketing practices have evolved and recent years have seen the addition of new practices such as frequent shopper discounts and club member discounts. Numerous questions have been posed to the NIST Weights and Measures Division (WMD) regarding the requirements for posting unit prices, calculation of total price, customer-operated controls, and other related topics such as the definitions for associated terminology.

It is clear from these questions that changes are needed to NIST Handbook 44 to ensure the requirements adequately address current marketplace conditions and practices. WMD has raised this issue with the NCWM S&T Committee and has also discussed a variety of pricing practices with individual state and local weights and measures jurisdictions.

NIST WMD is now in the process of reviewing the existing requirements and their application to current market practices. WMD has collected information on a number of scenarios, including the following: (NOTE: The conditions under some of these scenarios may not typically fall under the authority of weights and measures jurisdictions.)

- |  |  |
|--|--|
| (1) Frequent shopper discounts   | (8) Full Service   |
| (2) Club member discounts  | (9) Self Service   |
| (3) Discount for prepaying cash (to prevent "drive-offs")                  | (10) Progressive discounts based on volume of motor-fuel purchased |
| (4) Prepay at the cashier for credit sales                                 | (11) Coupons for discounts on immediate or future purchases        |
| (5) Discounts for purchasing store products                                | (12) Rebates (e.g., use of oil company credit card)                |
| (6) Discounts for purchasing a service (e.g., carwash)                     | (13) Day-of-the-Week Discounts                                     |
| (7) Targeted group discounts (e.g., Tuesday-Ladies 5 cents off per gallon) |  |

WMD is interested in receiving input from the weights and measures community about the various practices and pricing structures in use. Working with input from the weights and measures community, WMD plans to introduce proposed modifications to current requirements through the regional weights and measures associations and technical committees. In the meantime, WMD welcomes opportunities to discuss this issue at regional weights and measures associations to ensure the issue is adequately addressed.

WWMA acknowledged that marketing practices change on a daily basis and the task to ensure Handbook 44 codes address each scenario is monumental. However, WWMA encourages NIST in its efforts to tackle this ongoing issue. Therefore, WWMA recommends this issue be considered and move forward to the national level as a developing item.

CWMA recommends that the State Directors compile information regarding whether or not they are enforcing the Liquid-Measuring Devices Code in NIST Handbook 44 (including Paragraphs S.1.6.4. Display of Unit Price and Product Identity, S.1.6.5.4. Selection of Unit Price, UR.3.2. Unit Price and Product Identity, and UR.3.3. Computing Device). If they are not enforcing the specific code requirement, it should be determined why not (for example, overriding state statute). Information is to be sent to:

James Truex, Chief  
Division of Weights and Measures  
8995 E. Main Street  
Reynoldsburg, Ohio 43068

Phone: (614) 728-6290  
Fax: (614) 728-6424  
E-mail: truex@mail.agri.state.oh.us

NEWMA looks forward to further development of this item.

SWMA recommends adding this item to the NCWM S&T Committee's 2007 Agenda as a developing issue.

To comment on this proposal, contact NIST technical advisors to the NCWM S&T Committee: Richard Suiter at richard.suiter@nist.gov, or by telephone at (301) 975-4406, or Juana Williams at juana.williams@nist.gov or by telephone at (301) 975-3989, or either by fax at (301) 975-8091, or by mail at NIST WMD, 100 Bureau Drive MS 2600, Gaithersburg, MD 20899-2600.

### **Part 3, Item 1 Water Meters: UR.2.1. Accessibility for Reading.**

**Recommendation:** Add a new Paragraph UR.2. to Handbook 44, Section 3.36. Water Meters, as follows:

**UR.2. Accessibility for Reading. - A water meter shall be so located that there is reasonable access to obtain a reading by means of the primary indicating element or a remote indicating element. Otherwise, it shall be the responsibility of the device owner or operator to make available, within 24 hours of a request being received by the owner or operator from a current lessee, mortgagee, or titleholder, the necessary labor and support to provide the consumer a means to obtain a meter reading, provided such requests are made with a frequency consistent with the normal billing cycle of the utility.**

WWMA also considered an alternate proposal developed by California to add new Paragraph UR.2.1. to the Water Meters Code as follows:

**UR.2.1. Accessibility of Customer Indication. - An unobstructed standing space of at least 30 in wide, 36 in deep, and 78 in high shall be maintained in front of an indication intended for use by the customer to allow for reading the indicator. The customer indication shall be readily observable to a person located within the standing space without necessity of a separate tool or device.**

**Industry Position:** The industry proposal is intended to assist enforcement personnel in properly and uniformly enforcing the applicable regulations for obtaining meter readings. The proposed language is more appropriate than: 1) trying to define inherently ambiguous and subjective terms like “reasonable” and “ordinary circumstances” or 2) defining specific height requirements that insure visibility for customers and/or officials. Proposed new Paragraph UR.2.1. Accessibility for Reading should be added to Section 3.36 Water Meters Code of Handbook 44 because there needs to be language which describes acceptable and applicable provisions.

Industry members stated that existing language in General Code Paragraphs G-UR2.1.1. and G-UR.3.3. includes terms such as “reasonable” and “readily observable” which are subjective requirements; it is not possible to understand the installation requirements without relying on each local authority's interpretation of these terms, which varies even within the same jurisdiction.

Water submetering locations are in a vast majority of cases NOT chosen by the Service Agency or the property/meter owner, but are dictated by the engineers and architects who use both national and state building and plumbing codes as their primary guide.

The regulation which is most commonly cited on notices of violation for register visibility issues is Paragraph G-UR.3.3. Position of Equipment. Handbook 44 defines direct sale as “a sale in which both parties in the transaction are present when the quantity is being determined...”. Industry notes that Paragraph G-UR.3.3 is being misapplied and should have no bearing on a water submeter since both parties are **not** present when the quantity is determined. Furthermore, the antonym of a direct sale would be an indirect sale. NIST Handbook 130, Packaging and Labeling, Section 11. Exemptions, Subsection 11.1.1 Indirect Sale of Random Packages gives examples of indirect sales, several of which are

exact examples of how water submetering is paid for. Examples of such indirect methods include: on-line bill payments, phone bill payments, fax bill payments, and bill payments by mail.

Since water submetering is a commodity which is billed on a monthly cycle and since water submetering is not a direct sale where both parties are present at the time of the transaction, accessibility requirements for reading water meters should not be the same as those enforced on direct sale devices where transactions take place frequently and with both parties present.

If the interpretation of the terms “reasonable and readily observable” continue to be enforced as they are currently many meter owners will choose to abandon their systems for alternative billing methods such as “remote utility billing service” (RUBS) because replumbing existing water lines within walls is costly to building and coop/condo owners. This is especially true because there is no framework in place to know how to perform such a plumbing retrofit so that the work will be compliant with all interpretations of “reasonable” and “readily observable.”

A detailed, 12-month sampling of call center complaints from California properties showed that not a single complaint about the difficulty in obtaining a water meter reading had been received.

***Regional Association Positions:***

NIST Handbook 44, Water Meters Code Paragraph S.1.1.1. General permits a remote display as long as it is “readily accessible to the customer.”

The industry proposed language is no more definitive than existing language. The industry proposal removes the requirement for providing a readily accessible customer indicator. The alternative language would remove the vagueness from the current requirement while providing flexibility to installers.

Property owners do not read the indicators on each meter or they would be placed in a more convenient reading location. With remote reading, however, many meters are now being placed in inaccessible locations. Hardware is being installed to permit remote readings for billing purposes, but not for customers use.

Complaints have been lodged where the remote billing did not match the meter readings and we believe customers should be able to easily monitor their actual use without involving the property owner. Occasionally disputes exist between the property owner or manager and tenants that make requesting assistance a less desirable solution to reading a meter for verification.

The industry in California has been advised that remote customer indications are permissible. However, industry has not submitted devices for California type evaluation. Between better planning for the installation of future meters and submitting remote indicators to be approved for use by customers, this problem can be resolved in a manner more consistent with other device applications.

WWMA considered a proposal developed by industry and an alternate recommendation developed by California. The industry proposal permits access to indications either through a primary indicator, remote indicator, or requires the operator to provide a means for customer access to meter indications when given 24 hours notice within a billing cycle. The California proposal specifies the dimensions for a clear, unobstructed perimeter surrounding the device to ensure accessibility for viewing meter indications.

WWMA acknowledged that a device used to submeter a utility service is commercial equipment that presents a unique set of circumstances because the customer making the purchase does not observe the entire measurement operation, but receives a bill on a periodic cycle based on meter indications. In some cases, the operator/meter owner may be offsite and not required to observe primary meter indications, and may not be familiar with the unusual plumbing configurations that make it difficult to install an accessible meter and to read a meter. Consequently, no one General Code or Water Meter Code requirement appears to provide a complete and uniform set of guidelines that specify all conditions for making meter indications available so that the consumer can verify the measurement and allow the official to conduct an inspection. Some jurisdictions have developed policies to address this situation. In 2002, Paragraph S.1.1.1. was modified to ensure that when indications are remote they remain accessible to the customer.

In any case, requirements and jurisdiction policies should address the needs of the customer and the official for access to meter indications without placing an undue burden on the operator or customer, and they should not deter a customer from making a legitimate complaint. It is essential in the marketplace to have all components used in determining utility charges transparent; this includes meter indications that are available to all parties involved in the transaction.

WWMA agreed that each proposal has some elements necessary to address meter accessibility and indicator accessibility. Therefore, WWMA recommends the proposal become a developing item to allow time to rework the text so that there are uniform guidelines to fully address accessibility and include the following points: (1) Installation and location is such that there is no obstruction of the meter or indications and (2) Indications are accessible for viewing by the customer and official without the use of tools separate from the device.

WWMA encourages the California Division of Measurement Standards and industry to work together to develop a proposal for regional consideration.

At the fall 2006 CWMA Meeting, there was discussion that LP gas, natural gas, and electric meters should be included in this proposal; however, CWMA did not submit any additional language at this time.

SWMA supported the proposal moving forward as a developing item on the NCWM S&T Committee's 2007 Agenda.

To comment on this proposal, contact Ken Lake, California Division of Measurement Standards, by e-mail at [klake@cdfa.ca.gov](mailto:klake@cdfa.ca.gov) or by telephone at (916) 229-3047.

THIS PAGE INTENTIONALLY LEFT BLANK